AUTOMOTIVE INDUSTRIES

A CHILTON PUBLICATION

JULY 15, 1960

Features • • •

Buying Practices at Willys Motors

Inside Euclid's Tractor Plant

Production of Small Gas Turbines

Aluminum Castings for Corvair Engine

Automatic Honing of Cylinder Liners

Kaiser Plant in Argentina

Both four and six-cylinder engines are produced by Kaiser Industrias Argentina, S.A., at its Cordoba, Argentina, plant for production of six models of Jeep vehicles and three passenger cars

ENGINEERING
MANAGEMENT • • PRODUCTION
DESIGN

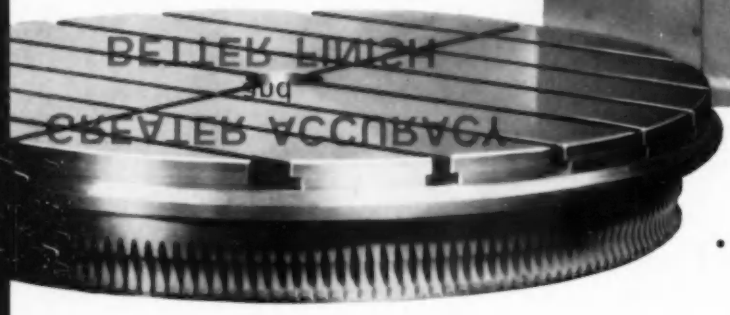
30″ HEALD ROTARY

surface grinds

rotary index tables

with

GREATER ACCURACY
and
BETTER FINISH



. . . and up to five times faster, too!

On this Heald Model 361 30″ Plain Rotary Surface Grinder, rotary indexing tables for other high-precision machine tools are ground flat and parallel within .0002″, and to a surface finish of 15 micro-inches or better. Cast iron tables from 10 to 30 inches in diameter are easily handled, as well as a variety of miscellaneous parts.

Although high production was not a requirement, this Rotary enabled parts to be finished up to *five times faster* while obtaining greater accuracy and better finish than could be obtained with previous methods.

An adjustable wheel dresser built into the wheel-guard permits truing the wheel without resetting the wheelslide or moving the table. And a demagnetizing switch facilitates setup and unloading.

Heald offers a complete line of high-precision rotary surface grinding machines with chuck sizes from 6 to 30 inches and either manual or automatic reciprocation. Ask your Heald engineer for complete details, or send for a copy of Bulletin 2-361-1 Issue 2.

It PAYS to come to Heald

MMT-PE
MODERN MACHINE TOOLS
PRODUCTION EFFICIENCY

THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.
Worcester 6, Massachusetts

Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • Milwaukee • New York • Philadelphia • Syracuse

HEALD®

KNOW YOUR ALLOY STEELS . . .

This is one of a series of advertisements dealing with basic facts about alloy steels. Though much of the information is elementary, we believe it will be of interest to many in this field, including men of broad experience who may find it useful to review fundamentals from time to time.

Annealing: Its Uses with Alloy Steels

Broadly speaking, the primary purpose of annealing is to soften steel and make it more workable. Annealing, as applied to alloy steels, may be defined as a process that heats above, and furnace-cools through, the critical range at a controlled, specified rate of speed; or that heats to a point within, and furnace-cools to a point below, the critical range. In either case, the choice depends upon the structure and maximum hardness desired.

The first method produces a lamellar pearlitic structure, while the second creates a spheroidized condition. These will be discussed separately in the following paragraphs:

(1) *Lamellar pearlitic structure.* It should be mentioned at once that this structure can be obtained both as described above and by a modified method known as isothermal annealing. In the isothermal process, the steel is heated above the critical temperature (austenitized), then transformed at a predetermined temperature, which depends upon the analysis. This operation requires two furnaces or salt baths —one for austenitizing, one for transformation.

Lamellar pearlitic structures are generally associated with machinability in carbon ranges from 0.20 to 0.60 pct, provided the hardness does not exceed the optimum maximum Brinell numeral. This is especially true where critical tooling is involved. It is a very versatile structure, as it gives best results in such operations as broaching, tapping, threading, deep drilling, boring, milling, and tooling as applied on single- and multiple-spindle bar automatic machines.

(2) *Spheroidized structure.* There are two general fields of use for this type of structure when alloy steels are employed. In the low and medium carbon ranges, spheroidization is necessary for cold-shaping operations, such as heading, extruding, drawing. In the higher carbon ranges (over 0.60 pct), it is mandatory where machining is involved, because it tends to lower the hardness of the steel.

If you want more details about these and other uses of annealing, and the results to be expected, by all means consult with our technical staff. And when you need alloy steels, Bethlehem can offer the full range of AISI standard grades, as well as special-analysis steels and all carbon grades.

This series of alloy steel advertisements is now available as a compact booklet, "Quick Facts about Alloy Steels." If you would like a free copy, please address your request to Publications Department, Bethlehem Steel Company, Bethlehem, Pa.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

FOR MAXIMUM AVAILABILITY SPECIFY

B&W *Job-Matched seamless mechanical tubing*

B&W offers you . . .

- a wide choice of tube diameters, wall thicknesses and lengths
- a broad range of standard and special analyses in carbon or alloy steels
- a complete variety of tube finishes — hot-finished, turned, cold-drawn or roto-rocked
- service from 2 tube mills—plus a nationwide network of district sales offices and steel service centers manned by *experienced* tube salesmen—ready to serve you *promptly*

These are just a few of the many reasons why it pays to specify B&W Job-Matched Seamless Mechanical Tubing. And remember—matching tubes to jobs assures you the *right tube,* in the *right quantity,* at the *right time.* For more information, call your local B&W District Sales Office, or write for Bulletin TB-430. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pennsylvania.

TA-9047-SM1

B&W THE BABCOCK & WILCOX COMPANY

TUBULAR PRODUCTS DIVISION

Seamless and welded tubular products, solid extrusions, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels and special metals

Circle 105 on Inquiry Card for more data

AUTOMOTIVE INDUSTRIES

A CHILTON MAGAZINE • PUBLISHED SEMI-MONTHLY

JULY 15, 1960

Passenger Cars • Trucks • Buses • Aircraft • Tractors • Engines • Bodies • Trailers • Road Machinery • Farm Machinery • Parts and Components • Accessories • Production and Processing Equipment • Design • Production • Engineering • Management

VOL. 123 No. 2

Features • • •

. . . continued on next page

AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (weekly) and the Motor Review (weekly) May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

EDITORIAL EXECUTIVE OFFICES, Chestnut and 56th Sts., Philadelphia 39, Pa., U. S. A. Cable address—Autoland, Philadelphia.

AUTOMOTIVE INDUSTRIES. Published semi-monthly by Chilton Company, Chestnut & 56th Sts., Phila. 39. Second Class Postage Paid at Philadelphia, Pa. Subscription price: To manufacturers in and suppliers to the automotive industries in the U. S., U. S. Possessions and Canada, $2.00 per year; $3 for 2 years. All Others $10.00 per year. Single copies, 75¢. Statistical Issue $2.00 and Products Guide Issue, $1.00, net.

AUTOMOTIVE INDUSTRIES

News Previews • • •

Departments • • •

HARTLEY W. BARCLAY, Editor and Publisher
JOHN F. PFEFFER, Assistant Publisher
H. H. ROBERTS, Engineering Editor

EDITORIAL STAFF

C. B. CAMPBELL, News Editor
ROBERT P. HOMER, Editorial Production Mgr.
CORNELIUS J. KELLY, Assistant Editor
NORMAN M LLOYD, Markets Editor
MARCUS AINSWORTH, Statistical Editor
HAROLD M NELSON, Specifications Editor
HOWARD KOHLBRENNER, Art Director
JANE LIVINGSTON, Products Guide Editor
Assistants—Inza Sherburne, Phyllis Bien

DETROIT
Joseph Geschelin, Detroit Editor
Hugh C. Quinn, Regional News Editor

PHILADELPHIA & NEW YORK
Charles A. Weinert, Eastern Editor

WASHINGTON
George H. Baker, Washington Editor
Neil R. Regeimbal, Wash. News Editor
Ralph W. Crosby, Wash. News Editor

LOS ANGELES
R. Raymond Kay, Pacific Coast Editor

LONDON
David Scott, British Correspondent

• • •

Paul Wooton, Washington Member, Editorial Board
Robert Gunning, Readability Consultant

As part of its worldwide automotive and aviation news coverage AUTOMOTIVE INDUSTRIES is serviced by United Press International and has editorial correspondents in major United States and Foreign industrial centers.

All unsolicited and contributed articles submitted without advance approval by the editors are sent entirely at the author's risk and the editors will not be responsible for safekeeping or prepaid postage return of such materials or photographs.

BUSINESS DEPARTMENT

E. H. MILLER, Advertising Mgr.
JAMES CADAGAN, Circulation Mgr.
JOHN H. KOFRON, Chilton Research Dir.
ALBERT N. CLARK, Marketing Mgr.

REGIONAL MANAGERS

CHICAGO—Carl A. Zehner 360 North Michigan Ave., Chicago 1, Ill., Phone RAndolph 6-2166

DETROIT—Thomas L. Pickrell 103 Pallister Ave., Detroit 2, Mich., Phone TRinity 3-7800

PHILADELPHIA and NEW YORK—Nelson W. Sieber, Chestnut & 56th Sts., Philadelphia 39, Pa. Phone SHerwood 8-2000; and 100 East 42nd St., New York 17, N. Y., Phone OXford 7-3400

CLEVELAND—George Kilbride 930 B. F. Keith Bldg., Cleveland 15, Ohio., Phone SUperior 1-2860

DALLAS—William J. Smyth 189 Meadows Bldg., Dallas 6, Tex., Phone EMerson 8-4751

SAN FRANCISCO—Frank W. McKenzie 1355 Market St., San Francisco 3, Calif., Phone UNderhill 1-9737

LOS ANGELES—L. H. Jackson 198 S. Alvarado St., Los Angeles 57, Calif., Phone DUnkirk 7-4337

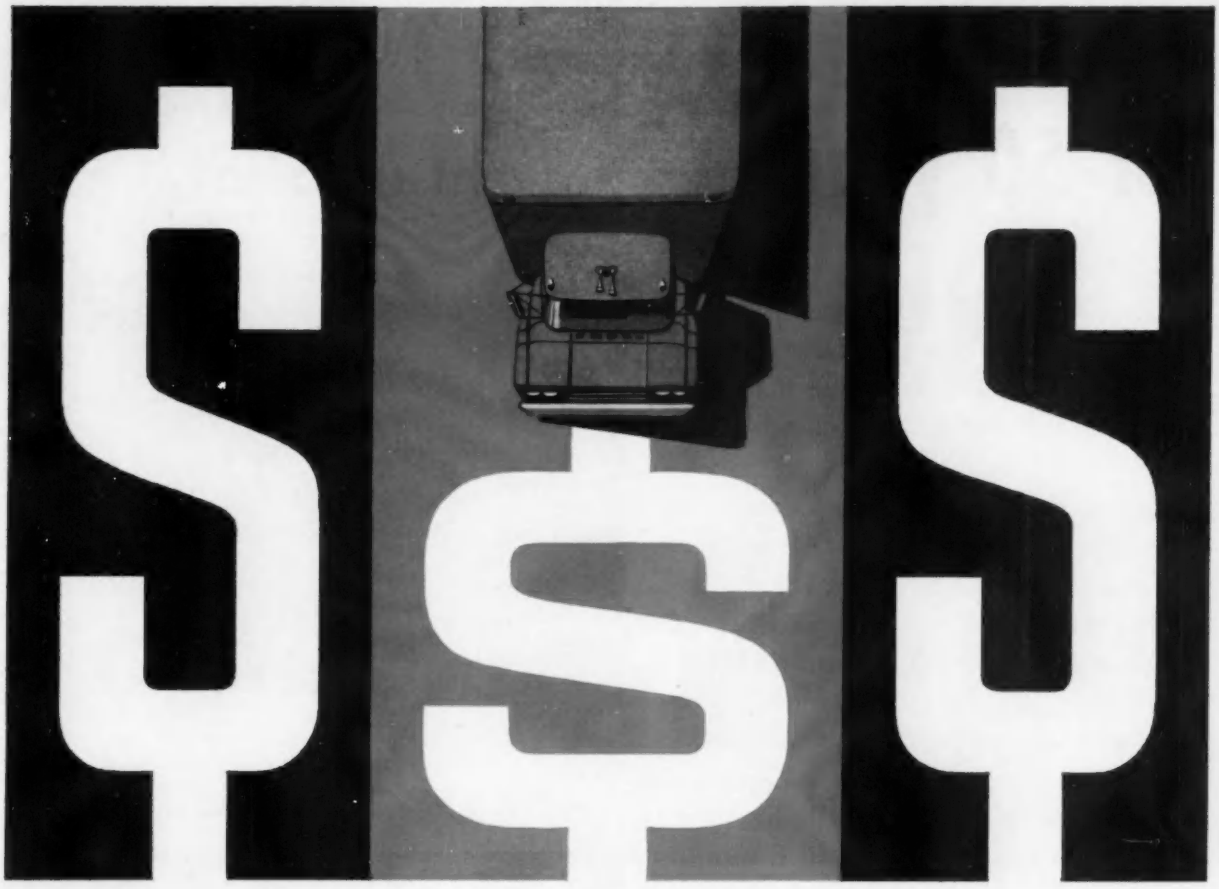
ATLANTA—John W. Sangston 32 Peachtree St., N. E., Atlanta 3, Ga., Phone JAckson 3-6791

CHILTON COMPANY
OFFICERS AND DIRECTORS

G. C. Buzby—President
P. M. Fahrendorf, L. V. Rowlands, Robert E. McKenna, George T. Hook—Vice Presidents
William H. Vallar—Treasurer
Maurice E. Cox, Frank P. Tighe, Everit B. Terhune, Jr., Russell W. Case, Jr., Charles A. S. Heinle, John H. Kofron, and George E. Cameron

Stanley Appleby—Comptroller

AUTOMOTIVE INDUSTRIES is one of the Publications Owned by CHILTON COMPANY. Executive Offices, Chestnut & 56th Sts., Philadelphia 39, Pa., U. S. A.



LOWER PRICE WITH BENDIX HYDROVAC® POWER BRAKES

Vacuum is the most popular power brake type by a big margin—and, among vacuum power brakes, Bendix Hydrovac is specified more often than all other makes combined. One big reason why over 5½ million Hydrovac units have been sold is that they save money. They cost less to buy . . . less to maintain. Any way you look at it, whether you build, buy, sell, or operate trucks, you'll find it pays to specify Bendix Hydrovac—the best in power braking.

PROTECTION—Hydrovac furnishes maximum dependability—with built-in safety standby of manual braking in case of power failure.

PAYLOADS—Hydrovac weighs considerably less, permitting up to several hundred pounds more payload—and thus adding to profit.

More Bendix Hydrovac vacuum power brakes are in use than all other makes

Bendix PRODUCTS DIVISION South Bend, IND.

THE Bendix CORPORATION

Supplying DIAMOND T for 50 years has taught us a lot

The year is 1911. Diamond T Motor Truck Company has just built its first truck. Like most automotive manufacturers, they have included chassis parts by Clark.

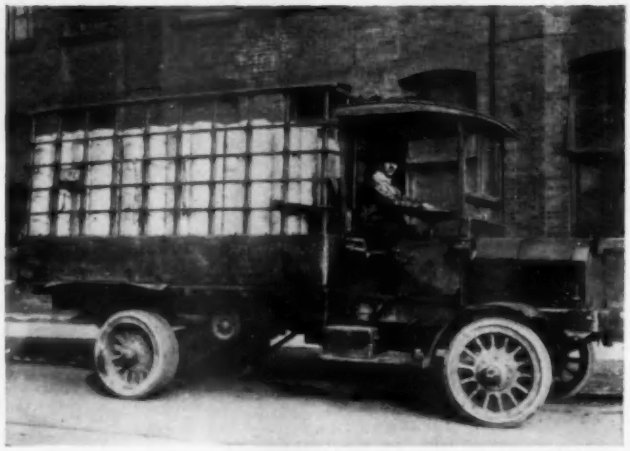
As time marches on and both companies grow, they continue to work together. Today, they still do.

In 1960, for example, a number of Diamond T's most popular truck and tractor models have *as standard equipment* Clark four and five-speed *transmissions.*

Latest development in the cooperation between the two companies is use of a Clark five-speed constant-mesh transmission as standard in several models of Diamond T's sensational new fiberglass Tilt-Cab line.

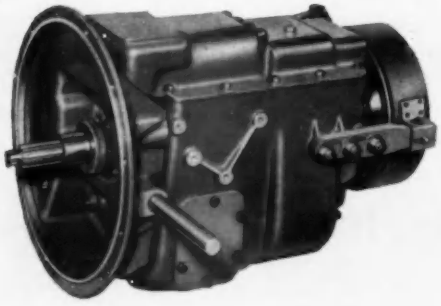
This transmission makes a major contribution to the Tilt-Cab tractor's over-all strength, light weight, long life, and safe handling. It is quiet-running, smooth, easy to operate, rugged and dependable. Diamond T engineers say they like Clark's fair price, high manufacturing quality, rapid and dependable delivery.

These same advantages are available to you. If you're a trucker, drive the new Diamond T fiberglass Tilt-Cab and see. If you're a manufacturer, ask us about other Clark transmissions for *your* truck, tractor, or bus.



The first Diamond T truck. Built in 1911, it included a number of Clark chassis parts. Vehicle was in service over 20 years.

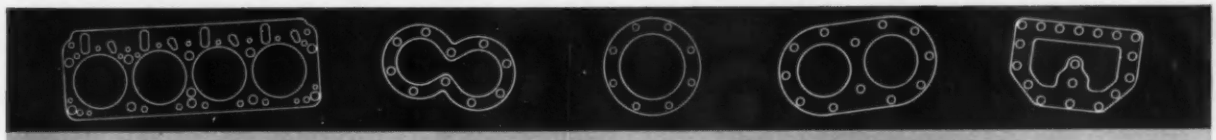
The latest Diamond T Tilt-Cab truck, a model 634CG. Just announced, its power train includes, as standard equipment, the Clark transmission shown below.



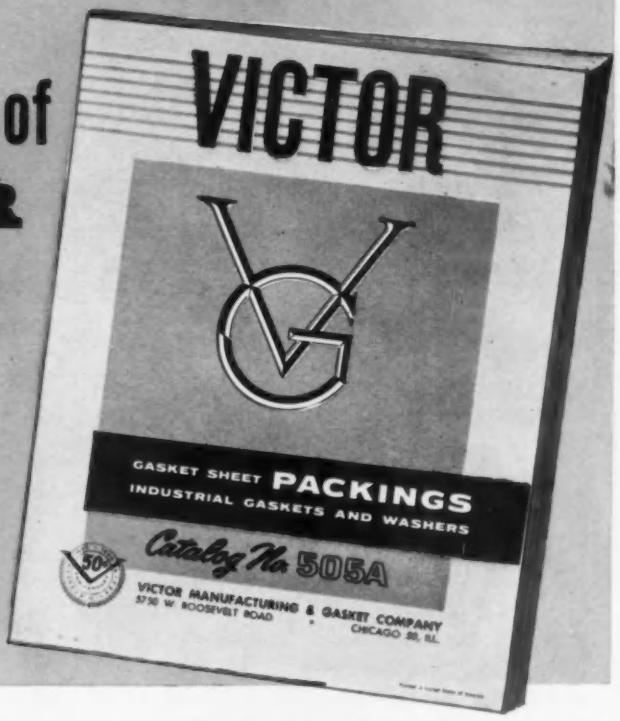
CLARK® EQUIPMENT

CLARK EQUIPMENT COMPANY
AUTOMOTIVE DIVISION
Buchanan 2, Michigan

Circle 107 on Inquiry Card for more data



New, bigger selection of VICTOR SHEET PACKINGS



Catalog 505A now being supplied to specifiers and buyers

Covers all standard compositions of asbestos, plant and cellulose fibers, cork and synthetic rubber—in various grades, including metal-core constructions

Sealing specifications come easier with this catalog at hand. It gives you all essential data to make the best choice of modern gasket packings for industrial applications—automotive, machinery, appliance, aeronautical and marine.

Right up front, this complete specification manual gives you both new and old SAE-ASTM classification numbers to which each Victor material in its various grades conforms.

Choosing from this catalog insures your intent of performance and value—Victor quality control sees to that! Also, you're assured of prompt availability —sheet packing or die-cut gaskets—by Victor's unmatched facilities.

Victor Mfg. & Gasket Company, P.O. Box 1333, Chicago 90, Ill. Canadian Plant: St. Thomas, Ont.

Send me Catalog 505A

(Mail this coupon or write on your letterhead)

Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State_____

VICTOR

Sealing Products *Exclusively*

GASKETS • PACKINGS • OIL SEALS • MECHANICAL SEALS

CALENDAR

OF COMING SHOWS AND MEETINGS

11th Annual Industrial Research Conference, Harriman, N. Y. Aug. 7-13

American Astronautical Society, Western National Meeting, Seattle ..... Aug. 8-11

Summer Institute, Non-Destructive Testing, Sacramento State College ..... Aug. 15-26

Western Electronic Show and Convention, Los Angeles..... Aug. 23-26

International Heat Transfer Conference, sponsored by ASME, American Society of Chemical Engineers, and IME, ICE (British) ..... Aug. 28 to Sept. 1

Machine Tool Exposition — 1960 (sponsored by National Machine Tool Builders Assn.), Chicago Sept. 6-16

Production Engineering Show, Chicago ..... Sept. 6-16

2nd Coliseum Machinery Show, Chicago ..... Sept. 7-15

ASME Engineering Management Conference, Cambridge, Mass. Sept. 7-9

Fall Meeting, Material Handling Institute, Virginia Beach, Va. Sept. 12-13

Steel Founders' Society of America Fall Meeting, Hot Springs, Va. Sept. 18-20

AWS National Fall Meeting, Pittsburgh ..... Sept. 26-30

SAE, National Aeronautic Meeting, Los Angeles ..... Oct. 10-14

Cast Bronze Bearing Institute, 1960 Annual Meeting, Asheville, N. C. Oct. 12

Magnesium Association Annual Convention, Cleveland ..... Oct. 17-18

42nd National Metal Exposition and Congress, Philadelphia .... Oct. 17-21

SPI. "Tooling for the Plastics Industry," New York City..... Oct. 19

1960 Fleet Maintenance Exposition, New York City..... Oct. 24-27

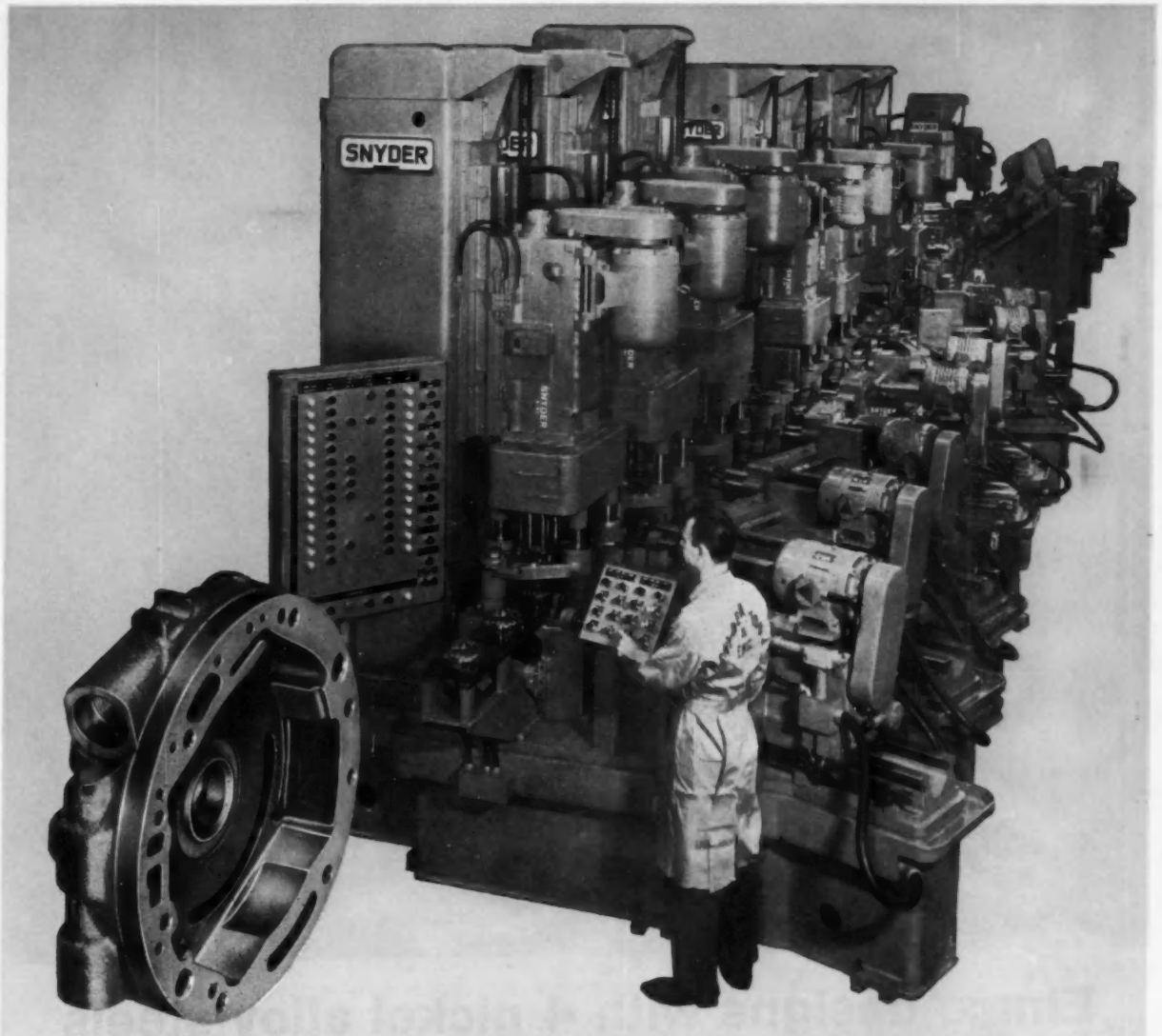
15th Annual Technical Exposition, American Society of Body Engineers, Detroit ..... Oct. 26-28

Material Handling Institute Show, Louisville, Ky. ..... Nov. 1-3

ASTME, Western Tool Show, Los Angeles ..... Nov. 14-19

Automotive Electric Association, 43rd Annual Meeting and 24th Annual Mfg.-Dist Conference, Chicago ..... Dec. 2-9

SAE, International Congress and Exposition, Chicago.... Jan. 9-13, '61



SNYDER BUILDING-BLOCK PRINCIPLE MAKES TRANSFER MACHINES VERSATILE, CONVERTIBLE, THRIFTY

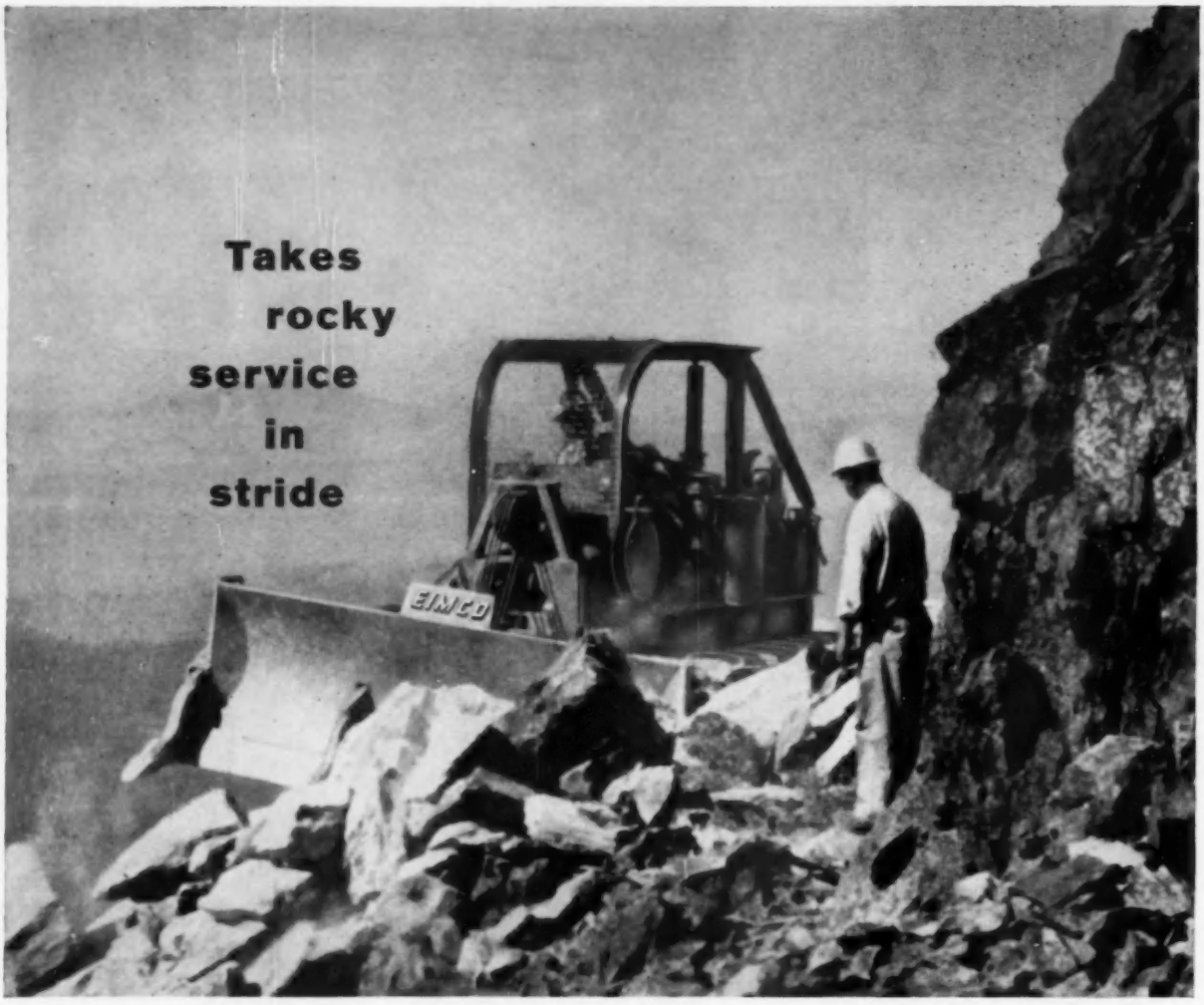
Transfer machines built up on the "building-block" principle are old stuff at Snyder and we've built all kinds of them—including the ones that turn corners and bring the part back to where it started from, processed from half-a-dozen angles, gaged, probed, automatically inspected in process, washed and dried and rejects marked for re-processing. Nothing to it if that's what the job calls for. We call it the Snyder Building-block Principle.

Here's an example of a fairly simple Snyder building-block transfer. This 58 station machine performs 74 operations on an automatic transmission pump body, drilling, reaming, tapping, gaging and probing 180 parts an hour at 100% efficiency. Any or all of its 22 segments can easily be converted to perform comparable operations on other parts. Also, the number of segments can be reduced or increased at any time, as need dictates. Your inquiries are invited.

SNYDER
CORPORATION
(Formerly Snyder Tool & Engineering Company)

3400 E. LAFAYETTE—DETROIT 7, MICHIGAN
Phone: LO 7-0123

Circle 110 on Inquiry Card for more data



Eimco designs with 4 nickel alloy steels for 20,000 hours' service without overhaul

Eimco crawler-tractors like this one have delivered up to 20,000 hours . . . about equal to 30 months of round-the-clock service . . . without any major overhaul. Without even a clutch adjustment.

What accounts for this durability? In transmissions, it's design based on the stamina of four nickel alloy steels. Each was carefully selected by Eimco engineers and metallurgists for its individual combination of strength, adaptability and economy.

4820 and 4620 steels for critical core strength. In all final drives, 4820 is specified for bevel pinions, 4620 for bevel gears. These nickel alloy steels – with outstanding shear strength and fatigue resistance – provide important fabricating benefits, too. They respond consistently to heat treatment . . . have superior resistance to warpage during quenching.

4817 steel for heavy-duty carburizing. Strategically used for heavily-stressed input shafts and drive pinions, this 3½% Nickel steel provides a critical extra measure of resistance to impact and wear.

8620 steel for vital gear hardness. 11 gears in Eimco "Unidrive" transmissions and 15 gears in "Quadra-Torque" drives depend on the carburizing properties of this versatile nickel-containing steel. AISI 8620 possesses the fine machinability plus excellent wear-resistance needed for close-tolerance gearing.

These and other nickel alloy steels – all readily available – can give you the properties you want, in practical combinations for specific requirements in performance, fabrication and economy. If you'd like our help with a special problem in materials selection, simply outline it in an informal letter to Inco.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street INCO New York 5, N.Y.

INCO NICKEL

NICKEL MAKES STEEL PERFORM BETTER LONGER

"How's she running, Bobby?"

Bobby's slick, little racer is probably running "fine", for it has a relatively simple engine with a minimum number of parts to worry about. Modern production-built automobiles are, of course, more complicated. For example, take the carburetor—heart of an automobile engine. It's a complex mechanism with as many as 90 to 125 separate parts and assemblies.

And—each model carburetor must be designed, engineered and built to the exact requirements of the car and its engine if smooth, efficient performance and maximum economy are to be assured.

Holley has been supplying precision-built carburetors to major manufacturers of automobiles for over 55 years. Through continuing research, Holley has contributed numerous improvements and new developments to carburetion and ignition to keep pace with the changing demands of cars and their engines.

In 1960, Holley Carburetors are *original equipment* on ten popular makes of cars—including four of the seven compacts built in the United States.

Holley Carburetors and Ignition Equipment maintain the Holley reputation for precision quality and dependable performance.

HOLLEY Carburetor Co.

Researchers and Developers in THREE of America's Most Important Industries

11955 E. Nine Mile Road • Warren, Michigan I-33

AUTOMOTIVE DIVISION • AIRCRAFT DIVISION • ELECTRO-MECHANICAL DIVISION

Circle 112 on Inquiry Card for more data

Electronic parts courtesy Judson Mfg. Co., Inc., Cornwells Heights, Pa.

Mirror-bright without polishing, after switch to Sunicut

Boring on a multiple-spindle automatic produced the finish you see on these electronic parts. Sunicut 102-S Cutting Oil saved time and money by eliminating the polishing operation. The same automatic uses Sunicut 102-S to machine metals ranging from titanium to stainless 410.

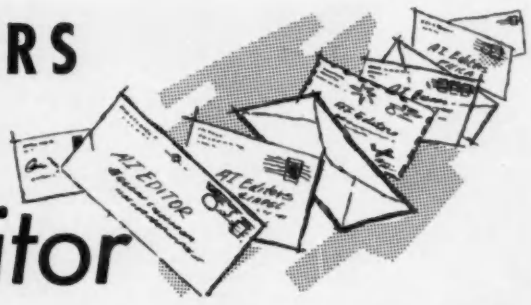
Sunicut 102-S is one of a full line of cutting oils known throughout metalworking for maintaining long tool life, close tolerances, and fine finishes. There's a grade of Sunicut that can help you improve your product quality—and *that's* the best economy of all.

To choose the right Sunicut, ask the Sun man; that's part of his service to you. Or write to SUN OIL COMPANY, Dept. AA-7, *Philadelphia 3, Pa. In Canada: Sun Oil Company Limited, Toronto and Montreal.*

SUNOCO

MAKERS OF FAMOUS CUSTOM-BLENDED BLUE SUNOCO GASOLINES

LETTERS to the Editor



Readers' opinions or requests for additional information on material appearing in the editorial pages of AUTOMOTIVE INDUSTRIES are invited for this column. No unsigned letters will be considered, but names will be withheld on request. Address *Letters to the Editor*, AUTOMOTIVE INDUSTRIES, 56th & Chestnut Sts., Philadelphia 39, Penna.

RECOVERY PROCESS

In your June 15 issue, you refer to a newly developed process for profitably recovering spent acid and dissolved iron from waste pickle liquor.

Will you please advise immediately where I can procure more information on this subject as this is a serious problem with two of our plants.

W. F. Dewey, Jr.
Plant Engineer
Grafton Plant
Wyman-Gordon Co.
Worcester, Mass.

● *Information is on the way.*

AUTOMOTIVE FASTENERS

Our heartiest congratulations and sincere thanks for wonderful job by AUTOMOTIVE INDUSTRIES showing close technical relationship between the Fasteners Industry and its biggest customer, the Automotive Industry.

Frank Masterson
President and General Manager
Industrial Fasteners Institute
Chicago, Ill.

ANTISMOG DEVICE

I read with interest the editorial "Efficient Antismog Device Developed By Thompson Ramo Wooldridge" which appeared in the May 1 issue of AUTOMOTIVE INDUSTRIES.

Had I not been familiar with the technique employed in the measuring of hydrocarbon emissions, I would probably have been impressed by the efficiency indicated by the strip charts pictured in the article.

Injecting make-up air into the exhaust manifold of any engine will certainly dilute the hydrocarbon concentration but will not alter the weight of the hydrocarbon emission.

I am not saying that the afterburner is without merit, but a portion of the efficiency claimed is due strictly to air dilution.

If a trace of the hydrocarbon concentration, after mixing with air were shown, then the true efficiency of the afterburner could be determined.

Jack B. King
Project Engineer
Engineering Staff
General Motors Technical Center
Detroit, Mich.

ROLLS-ROYCE

Thanks ever so much for your letter giving us permission to use the R-R article from AUTOMOTIVE INDUSTRIES. At present I can find only one spare copy of the last issue containing the article from your magazine, but I am sending an assortment of back issues which I hope you will find interesting.

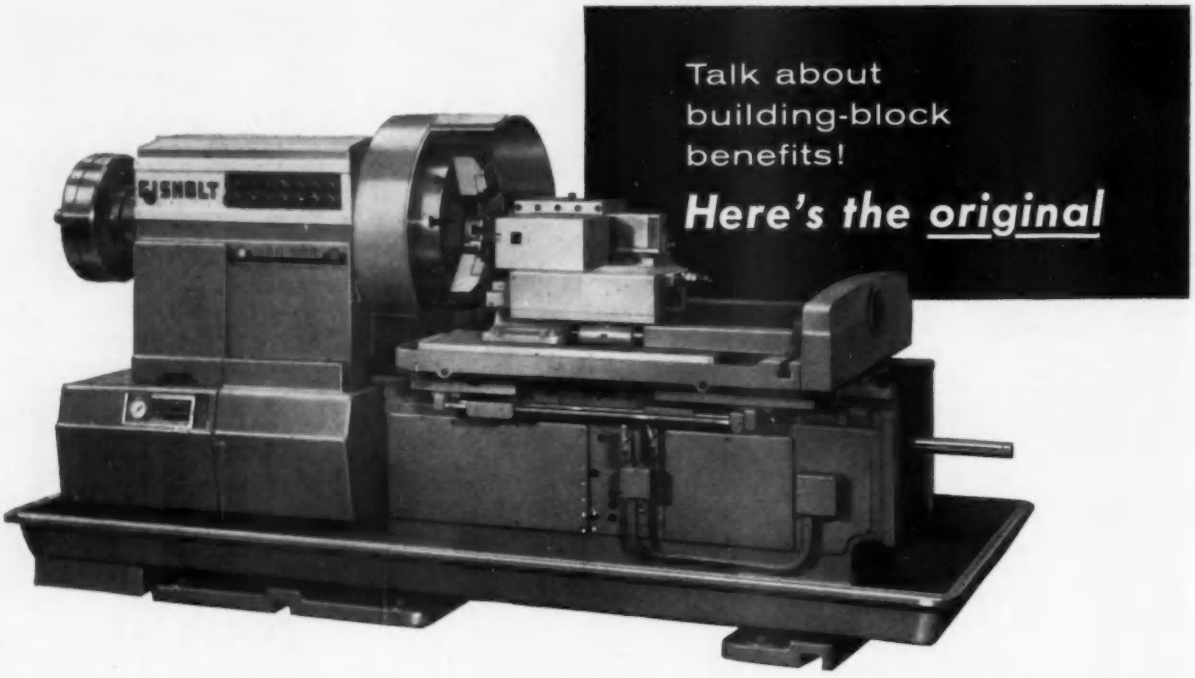
J. R. Utz
Associate Editor
The Flying Lady
The Bulletin of Rolls-Royce Owners
Rochester, N Y

TRAINING PROGRAM

I am presently conducting supervisory training classes for approximately 200 men, and would like to have permission to reprint the article "Team Concept Used at Mack Truck In Buying Steel Products" which appeared in the June 1 issue, to use in our training work.

R. M. Ney
Training Supervisor
Mack Trucks, Inc.
Allentown, Pa.

● *Permission granted provided full credit is given to* AUTOMOTIVE INDUSTRIES—*Ed.*



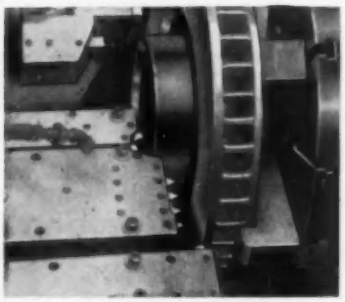
It does the work of special machines at standard machine cost

Here in the Gisholt MASTERLINE Simplimatic Automatic Chucking Lathe is the essence of the building-block principle: a standard headstock and bed casting with a wide, flat platen table. To this you add the building blocks for most efficient tooling on each specific job. Standard front, center, rear or auxiliary slides with tool blocks may be positioned wherever they are needed to handle a maximum number of surfaces per chucking.

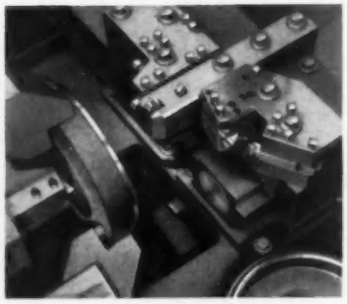
Between cycles, the platen table is well away from the spindle, providing easy access for loading and unloading. The table is screw-fed. This permits rapid advance to position the tools right up to the work, or table-feed to bore, turn an O.D., or plunge facing tools to depth before slide movements begin. Each slide may feed at different rates, permitting an unlimited variety of cuts and tool approaches.

Back boring and facing attachments permit machining front and back surfaces simultaneously, eliminating extra handling and equipment cost.

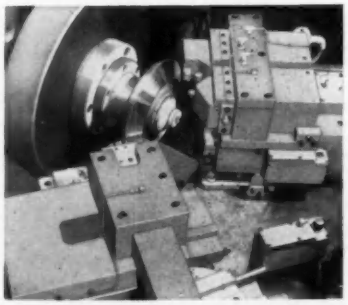
Three of the 39 jobs described in the Simplimatic Catalog are shown here. Write for Bulletin 1159-C or contact your Gisholt Representative to find out what the Simplimatic can do for you.



13.8 minutes! Cast iron rotor, 28" O.D., 6½" wide. Table feed turns O.D., plunges facing tools to depth. Slides face flange, complete hub. Two-speed motor gives high speed for finish facing flange and chamfering.



2.4 minutes! Front and rear brake drums. Back facing attachment machines mounting face. Front slide turns and bores. Rear slide faces web and rim.

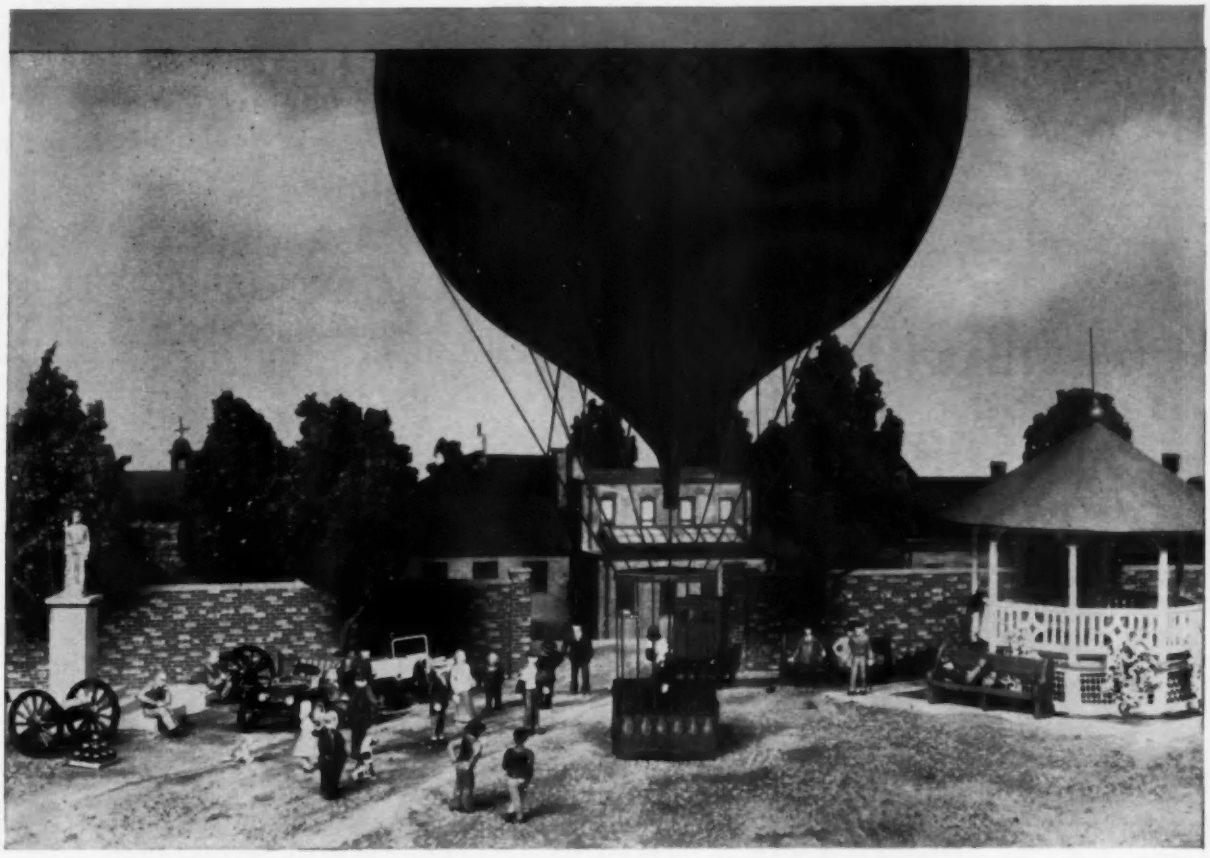


2.3 minutes! Steel bevel gear blank. Rear swivel-base slide tools straddle machine back angle, front co-bore and face as cam-controlled front slide tools face front angle.

• Turret Lathes • Automatic Lathes • Balancers
Superfinishers • Threading Lathes • Factory Rebuilt
Machines with New-Machine Guarantee

GISHOLT®
MACHINE COMPANY
Madison 10, Wisconsin, U.S.A.

Circle 115 on Inquiry Card for more data



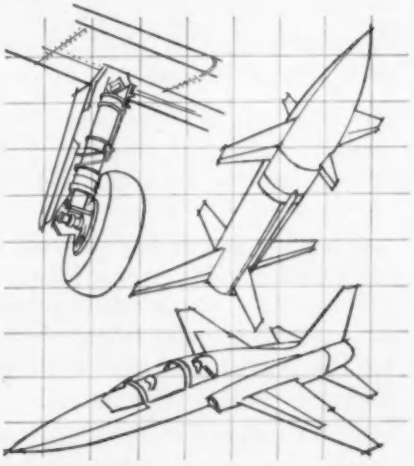
Are you up in the air over tubing sources?

If you have ballooning production problems, consider these important facts. OSTUCO Tubing is always the exact tubing you need for your product because OSTUCO Tubing is CUSTOM MADE for your product. Your order is manufactured to your own specifications to produce steel tubing especially for your application — the precise grade, analysis, size, shape, special anneal and tolerances best suited to your needs.

Ohio Seamless Tube produces both seamless and electric welded steel tubing — is prepared to form many finished or semi-finished tubular parts to your designs.

To get the most from your next steel tubing order, use Custom Made OSTUCO Tubing. Contact your nearest Ohio Seamless representative, or send part drawings to the plant at Shelby, Ohio — Birthplace of the Seamless Steel Tube Industry in America.

A-2449A



Model illustrated built to 3.5 mm scale.

OSTUCO SHELBY, OHIO

OHIO SEAMLESS TUBE

Division of Copperweld Steel Company • SHELBY, OHIO

Seamless and Electric Resistance Welded Steel Tubing • Fabricating and Forging

SALES OFFICES: Birmingham, Charlotte, Chicago (Oak Park), Cleveland, Dayton, Denver, Detroit (Huntington Woods), Houston, Kansas City, Los Angeles (Lynwood), Miami, Moline, New York, New Orleans (Chalmette), Philadelphia (Wynnewood), Pittsburgh, Richmond, Rochester, St. Louis, St. Paul, Salt Lake City, Seattle, Tulsa, Wichita

CANADA: Railway & Power Engr. Corp., Ltd. • EXPORT: Copperweld Steel International Company, 225 Broadway, New York 7, New York

Automotively speaking... AMCHEM SPEAKS YOUR LANGUAGE!

Amchem service in automotive phosphating processes goes far beyond the sale of chemicals.

For instance, the Amchem "Technical Service Report" developed over 13 years ago has been adopted as virtually a standard form among leading automotive manufacturers. This monthly report incorporates all pertinent chemical and equipment performance data in one convenient form, has manifold advantages in keeping local and district management informed of line conditions for chemical control and maintenance, produces higher levels of quality through extra vigilance in controlling chemical baths and equipment.

In the past Amchem service has achieved significant advances in automotive prepaint finishing, among them—Deoxidine, the first corrosion-proofing treatment for use in mass production of steel automobile bodies; the first spray process for rust-proofing steel; and Granodine, the spray phosphating process that has become the accepted standard in industry.

Amchem has spent a lifetime (all 46 years of its corporate existence) providing phosphating services to the automotive field. If your requirements embrace more than phosphating chemicals alone, look to Amchem's Metal Protection Laboratories where, automotively speaking, we speak your language!

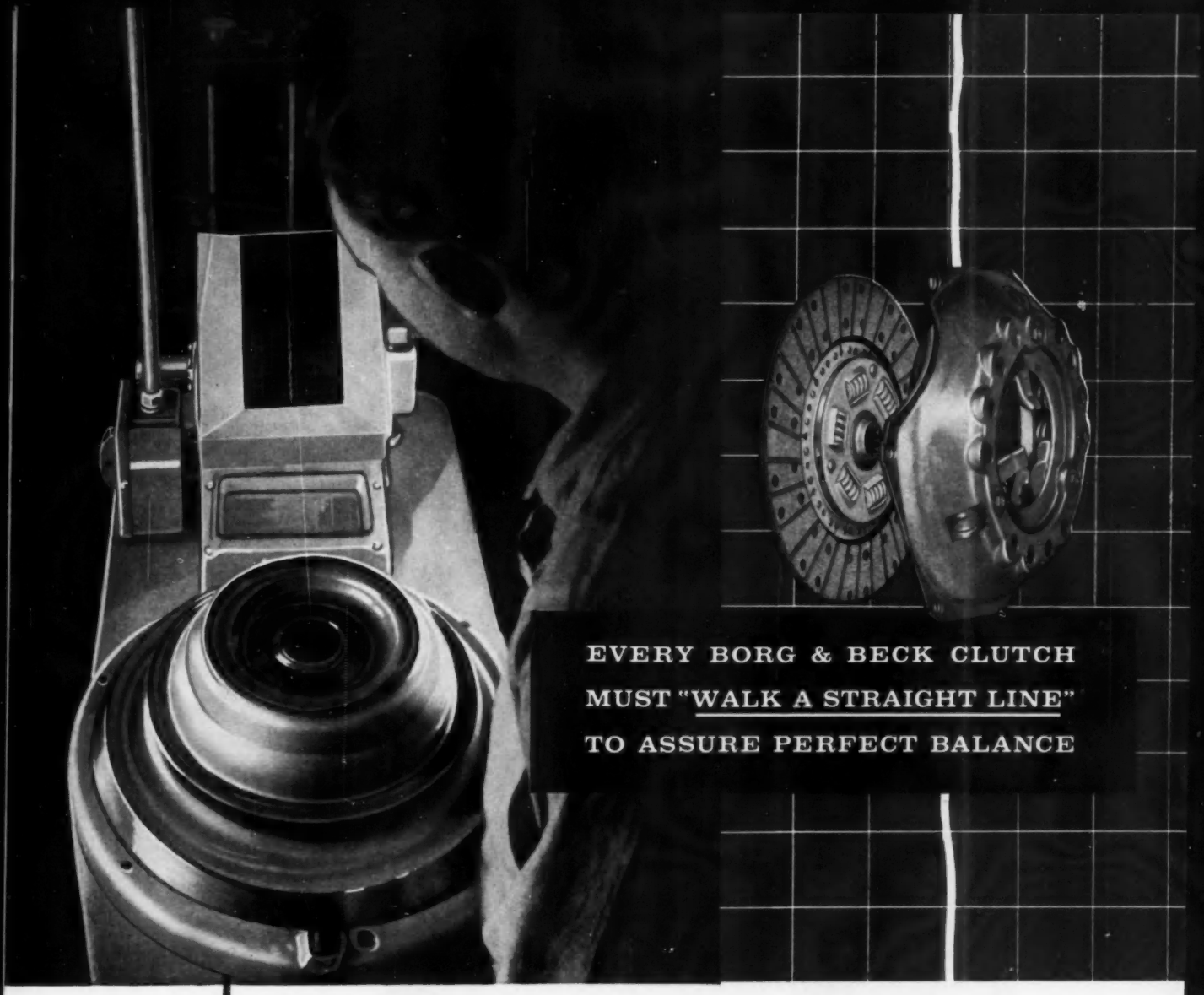
AMCHEM

AMCHEM PRODUCTS, INC.

(formerly American Chemical Paint Co.)
AMBLER, PA.

Detroit, Mich., St. Joseph, Mo., Niles, Calif., Windsor, Ont.

Amchem, Granodine and Deoxidine are registered trademarks of Amchem Products, Inc.



EVERY BORG & BECK CLUTCH
MUST "WALK A STRAIGHT LINE"
TO ASSURE PERFECT BALANCE

Probably the most important single quality in a clutch is *balance*—because balance means smoothness of operation, not only of the clutch but of the engine as well.

That's why Borg & Beck clutches are checked for balance, at operational speeds, on specially designed test machines. Even the slightest unbalance is instantly detected and carefully corrected. Perfect balance is assured, as shown above, when the electric beam of the oscillograph is vertically straight on the calibrated screen. And every Borg & Beck clutch must "walk this straight line" before it passes inspection.

This is typical of the extra care that goes into every step in the making of Borg & Beck clutches. It is your assurance of top quality, top performance, top value.

BORG & BECK CLUTCH · THE STANDARD ·
Reg. U.S. Pat. Off.

BORG & BECK
B-W
BORG-WARNER

BORG & BECK®

THE AUTOMOTIVE STANDARD FOR MORE THAN 40 YEARS

BORG & BECK DIVISION, BORG-WARNER CORPORATION, CHICAGO 38, ILLINOIS

Export Sales: Borg-Warner International, 36 S. Wabash, Chicago 3

Circle 118 on Inquiry Card for more data

Circle 119 on Inquiry Card for more data →

Report to the **SMTS*** *Committee*

*SPECIAL MACHINE TOOL STANDARDS

DELIVERY:

MMT·PE SEE SMTS ECONOMATICS • BOOTH 1440 MACHINE TOOL EXPOSITION

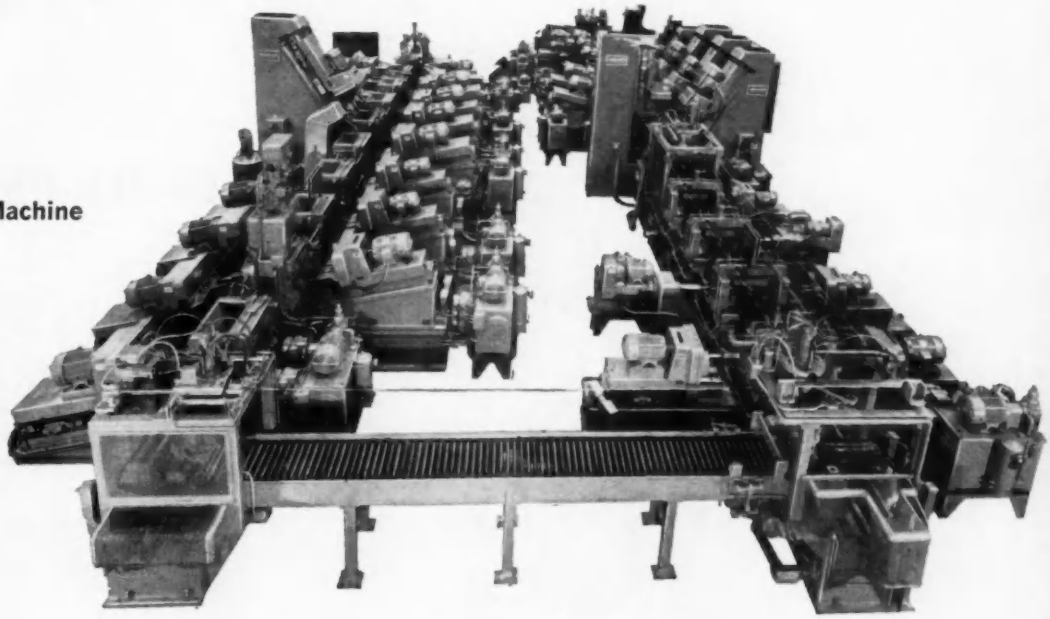
BUHR'S "BABY"

arrives on time . . .

Weight: **500 tons**

Length: **220 feet**

Genus: **Transfer Machine**



What's all the excitement about? Buhr's Baby, the first major machine built to the Special Machine Tool Standards, has been delivered to its proud owner—a major American automobile manufacturer. And it's some baby!

A lift-and-carry, part-through transfer, with fifty-eight stations, the machine is designed to perform 323 precision operations in automatic sequence on cylinder heads for a 1961 model automotive engine. Operations, in addition to rough and finish machining, include probing, sealer application, assembling, pressure testing, rejecting and injecting . . . you name it. It's fast, too. The work cycle is only 30.0 seconds. Capacity at 100% efficiency is 120 pieces per hour. It's some baby, alright! Because it was built to the new Standards, it's the most flexible and readily convertible multiple operation machine tool ever built. It's the first in a broad new line of SMTS Babies that Buhr is now building.

BUHR

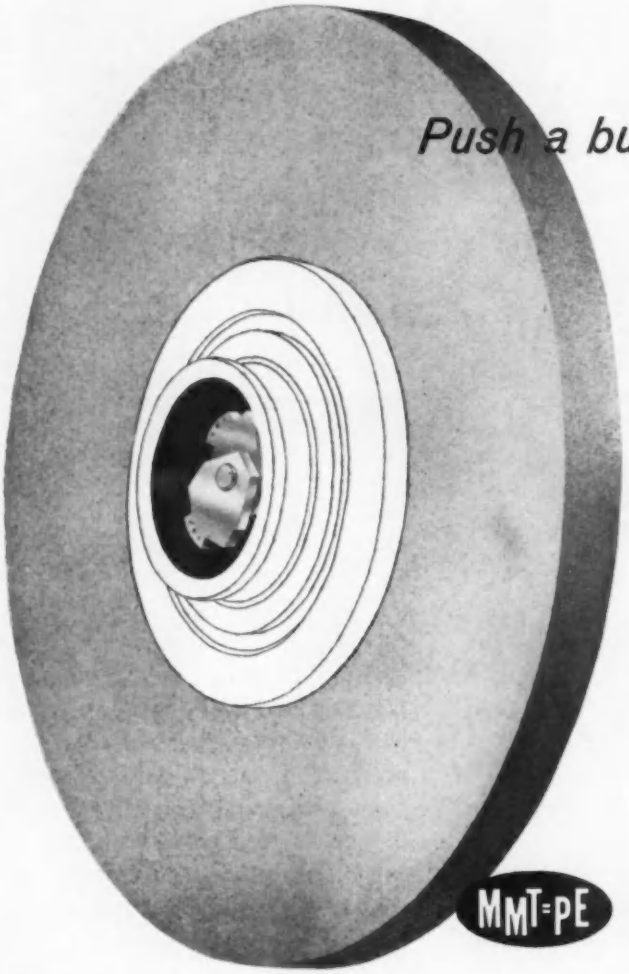
(say **BURE**)

ECONOMATIC

BUHR MACHINE TOOL COMPANY • ANN ARBOR, MICHIGAN

A. Unbalance. Badly out of balance wheel is shown in grinding position on the NORTON Balancer. Pendulum weights are locked in balance correcting position for wheel previously in use. Heavy spot, shown by yellow area, tends to displace center line of wheel spindle from normal center of rotation.

Push a button to balance

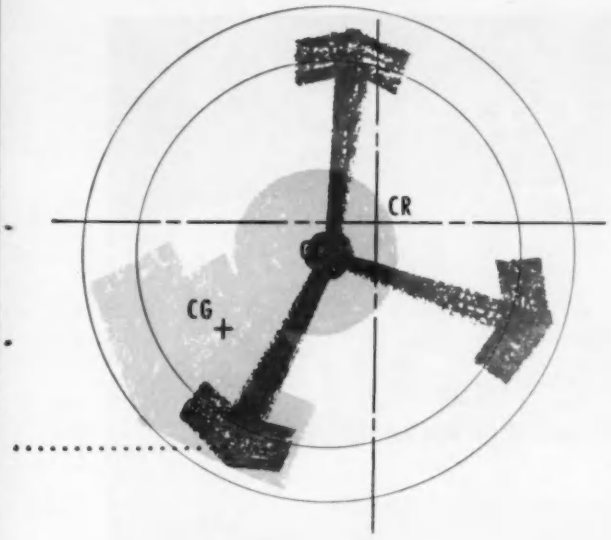


B. The Button Is Pushed. Wheel adapter assembly moves to soft spring suspension. Assembly tries to rotate about center of gravity. Centrifugal force acting outwards from center of rotation causes pendulum weights to move away from heavy spot, as shown.

C. Balanced in 5 Seconds. Pendulum weights have moved to the correct balancing position opposite the heavy spot. Center of gravity, center line and center of rotation are now common as shown. Weights lock and wheel adapter assembly returns to grinding position.

Unusual simplicity of the new NORTON Automatic Wheel Balancer introduces new advantages to unusual grinding operations. The wheel spindle and bearings are never released from carefully fitted housing. Balancing action is developed by slight release of *only* the wheel assembly from nose of spindle, permitting the assembly to be carried while balancing on a floating spring shaft. Three pendulum type balancing weights give maximum sensitivity to positioning forces. Wheel assembly and balancing weights are clamped and released automatically. Loosening a single spanner nut enables quick wheel changes. Safety interlock prevents operation of mechanism during grinding.

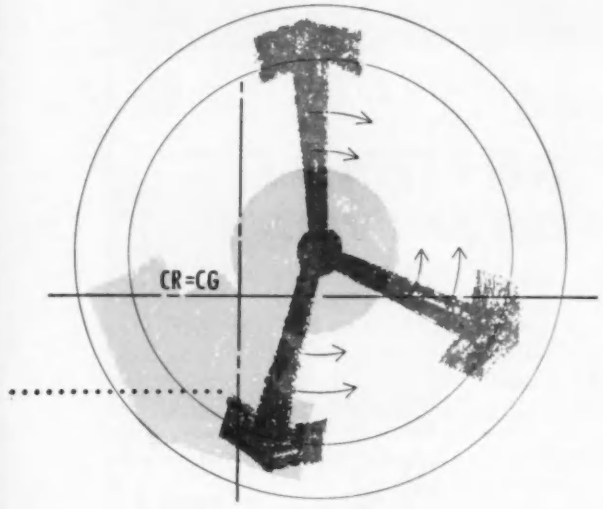
NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — **BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

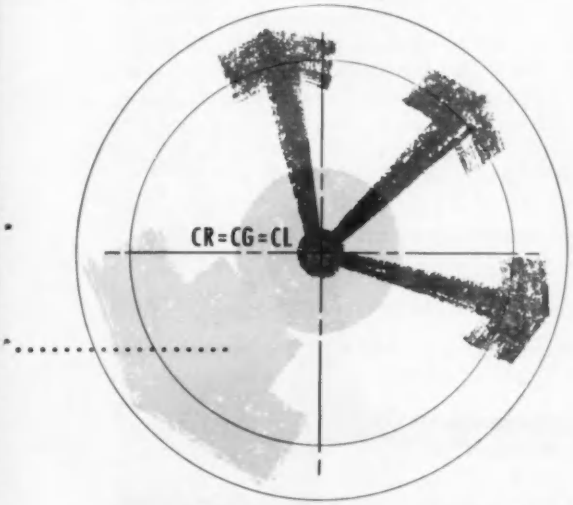


CG = Center of Gravity
CL = Center Line of Wheel Spindle
CR = Normal Center of Rotation

grinding wheels precisely . . .

automatically in 5 seconds





New and optional, the NORTON Automatic Wheel Balancer simplifies an extra operation for extreme precision grinding.

Engineered for ruggedness and high precision, NORTON cylindrical grinders have long been recognized for producing completely satisfactory results without wheel balancing — on or off the machine.

That holds good for all but a very small minority of grinding jobs calling for the absolute extreme in precision grinding. It is for such special requirements that the NORTON Automatic Wheel Balancer is designed.

That is why it is optional on most NORTON cylindrical grinders — and that is how it teams up to produce more positive precision than has ever been obtainable with previous wheel balancing methods.

Read the diagrammed descriptions shown here. See how simply, surely and swiftly the NORTON Automatic Wheel Balancer brings new advantages to wheel balancing for maximum precision grinding. For further details, see your Norton man, a Trained Grinding Engineer. Or write to NORTON COMPANY, Machine Tool Division, Worcester 6, Mass. *District Offices:* Worcester, Hartford, Cleveland, Chicago, Detroit. *In Canada:* J. H. Ryder Machinery Co., Ltd., Toronto 5.

NORTON
MACHINE TOOLS

75 years of . . . **Making better products . . . to make your products better**

MACHINE TOOL DIVISION: Grinding and Lapping Machines — **G & E DIVISION:** Shapers • Gear Cutting Machines • Gear Induction Hardeners

Circle 120 on Inquiry Card for more data

SAFE EMERGENCY STOPS...

WITH Wagner® Lockheed
MANUAL AND FULLY AUTOMATIC
TRACTOR-TRAILER PROTECTION VALVES

WAGNER EMERGENCY BRAKE VALVE

provides "push-pull" manual control to activate the tractor's emergency protection system and to trigger emergency braking on the trailer.

WAGNER TRAILER RELAY EMERGENCY VALVE

fully applies the trailer brakes when the emergency brake valve is actuated manually by the driver, or automatically if the tractor system pressure drops to an unsafe value.

WAGNER TRACTOR AIR LINE PROTECTION VALVE

automatically isolates the tractor air supply by sealing the service and emergency air lines if the trailer is uncoupled, breaks away or loses its air supply. It also automatically activates trailer emergency valve to apply trailer brakes if tractor system pressure drops to an unsafe value.

Braking emergencies are something truckers have to live with. But, they can live with them a lot more safely if you equip the vehicles you make with Wagner Lockheed Emergency Brake Valves and Tractor Air Line Protection Valves. These valves, when used with the Wagner Trailer Relay Emergency Valve, give drivers of your vehicles safe emergency braking.

Wagner builds components for *all* braking systems —air or hydraulic; everything from the actuating system to the foundation brakes. REMEMBER, when you equip the vehicles you manufacture with Wagner Lockheed Emergency Brake Valves and Tractor Air Line Protection Valves, you add safety and low-maintenance features that build customer acceptance.

CONSULT YOUR WAGNER AIR BRAKE SPECIALIST

Let him help you with your specifications, and also ask him about the engineering consulting service available from Wagner.

Wagner Electric Corporation
6363 PLYMOUTH AVENUE, ST. LOUIS 33, MISSOURI

WK60-6A

LOCKHEED BRAKE PARTS, FLUID, BRAKE LINING and LINED BRAKE SHOES • AIR HORNS • AIR BRAKES • TACHOGRAPHS • ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES

***Experience**—the added alloy in* **Allegheny Stainless**

Sample pages from A-L's new free booklet on design

"Design and Allegheny Stainless" is illustrated page after page with hand-picked examples of good design in the gleaming metal.

Twenty-four photographs and drawings in full color, twenty-six in dual color and black and white become a showcase of the versatility of stainless.

The examples are presented with text in terms of Function, Shape, Texture and Color. They cover many fields from automotive parts to holloware for the home . . . to open new horizons for the designer.

There is a working outline of types and properties in the many grades of Allegheny Stainless. Some of the new textures illustrated will interest the designer looking for new effects.

Write for your copy of "Design in Allegheny Stainless Steel"—without cost or obligation. *Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa. Address Dept. AI-7.*

Packed with actual examples of good design—and ideas for future applications

ALLEGHENY LUDLUM

Export distribution: AIRCO INTERNATIONAL

EVERY FORM OF STAINLESS . . . EVERY HELP IN USING IT

AL

994

Circle 122 on Inquiry Card for more data

NATIONAL OIL SEAL LOGBOOK

Presenting!

NATIONAL BUD UNITIZED

TRADE MARK

Flanges, if desired, are available to simplify positioning and removal

National BUD UNITIZED has integral wear ring presenting rubber surface to shaft. Wear ring turns with shaft, sealing lip is never exposed to damage, cannot score shaft.

A new unitized oil-seal-and-wear ring that eliminates:

SHAFT WEAR OR SCORING

SEPARATE METAL WEAR SLEEVES

EXPENSIVE SHAFT FINISHES

COSTLY SHAFT RE-MACHINING

SEALING LIP INSTALLATION DAMAGE

SPECIAL INSTALLATION PROCEDURES

New National BUD UNITIZED seals are now in production, in a limited range of sizes, for heavy oil and grease sealing applications — including truck, bus and tractor uses. Still newer BUD UNITIZED seals are on the way for higher speed automotive and similar uses.

Changing a National BUD UNITIZED oil seal automatically changes the wear sleeve — in one fast, simple operation. Since the seal has its own integral wear ring, it is almost impossible to install it other than squarely on the shaft. Expensive shaft finishing is no longer a necessity, nor is leakage under a metal wear ring a problem — both thanks to the rubber surface BUD UNITIZED presents to the shaft.

For complete details or skilled engineering help on application of BUD UNITIZED seals, write direct, or call your National Seal Applications Engineer. You'll find him in the Yellow Pages, under Oil Seals.

NATIONAL SEAL

Division, Federal-Mogul-Bower Bearings, Inc.
General Offices: Redwood City, California
Plants: Van Wert, Ohio, Redwood City and Downey, California

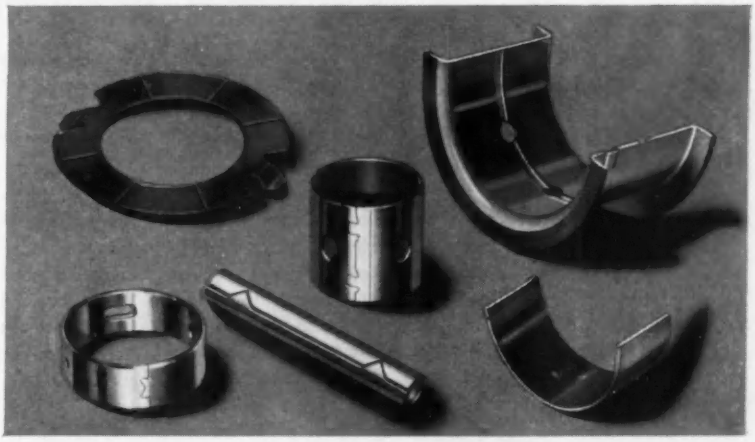
6013-R

Circle 123 on Inquiry Card for more data

75-MILLIONTHS OF AN INCH BARRIER HALTS METAL MIGRATION

JUST BENEATH THE FRESH OVERPLATE OF THESE F-M ENGINE BEARINGS (LEFT) LIES A TENUOUS DIFFUSION BARRIER. Though this film of metal is only 75-millionths of an inch thin, it stops tin in the overplate from migrating into the lining metal beneath. Its presence is important to bearing overplate performance, particularly during the critical period of engine break-in. Maintaining uniform thinness as well as uniform composition of the plated barrier is most important . . . and most difficult to achieve on a production scale. Federal-Mogul research has developed a unique, extraordinarily precise method for controlling both the thinness and the metallic composition of this barrier, within narrow limits. And the performance of F-M engine sleeve bearings attests to the success of the method!

RESEARCH INTO ELECTROPLATING problems is a continuing project in the F-M laboratories. Unusual precision equipment and facilities are employed, many of which have been specially designed and engineered by F-M to solve problems of sliding-bearing application. As a result, Federal-Mogul engineered sleeve bearings, precision thrust washers, formed bushings, and low-cost spacers provide the finest possible performance characteristics for any application.



Have you a problem with bearings, bushings or washers? Are you considering the development or redesign of an item of the type shown above? We'll be glad to show you how the job can be done most effectively and economically. For information, write Federal-Mogul Division, Federal-Mogul-Bower Bearings, Inc., 11037 Shoemaker, Detroit 13, Michigan.

FEDERAL-MOGUL

sleeve bearings
bushings-spacers
thrust washers

DIVISION OF
FEDERAL-MOGUL-BOWER
BEARINGS, INC.

For advanced fuel...hydraulic...lube systems,

New materials prove ideal in handling temperature extremes −350° F. to +750° F.

Working with two remarkably versatile elastomers, C/R Sirvene engineers are producing flexible molded parts for many vital fuel, lubricating, hydraulic and pneumatic systems. One, Viton-A*, can be compounded to produce parts that function dependably at 600° F., and for short periods up to 750° F. The other important feature of Viton compounds is their excellent resistance to corrosive chemicals, chlorinated solvents as well as both synthetic and petroleum base fuels and lubes. At the other extreme, C/R compounded Silastic LS-53** parts are providing low temperature operation down to -80° F. They also exhibit excellent resistance to synthetic and petroleum base fluids up to 350° F., and function well in propane up to 500° F. For temperatures as low as -350° F., C/R recommends Teflon* compounds.

C/R Sirvene engineers have an intimate knowledge of these elastomers. They also have perfected special techniques in processing which still further improve the physical properties of the molded parts. If your problem involves high or low temperatures, close tolerances, and compatibility in advanced design fuel, lubricant or hydraulic systems, get in touch with us at once. We have the skill and the facilities to help you.

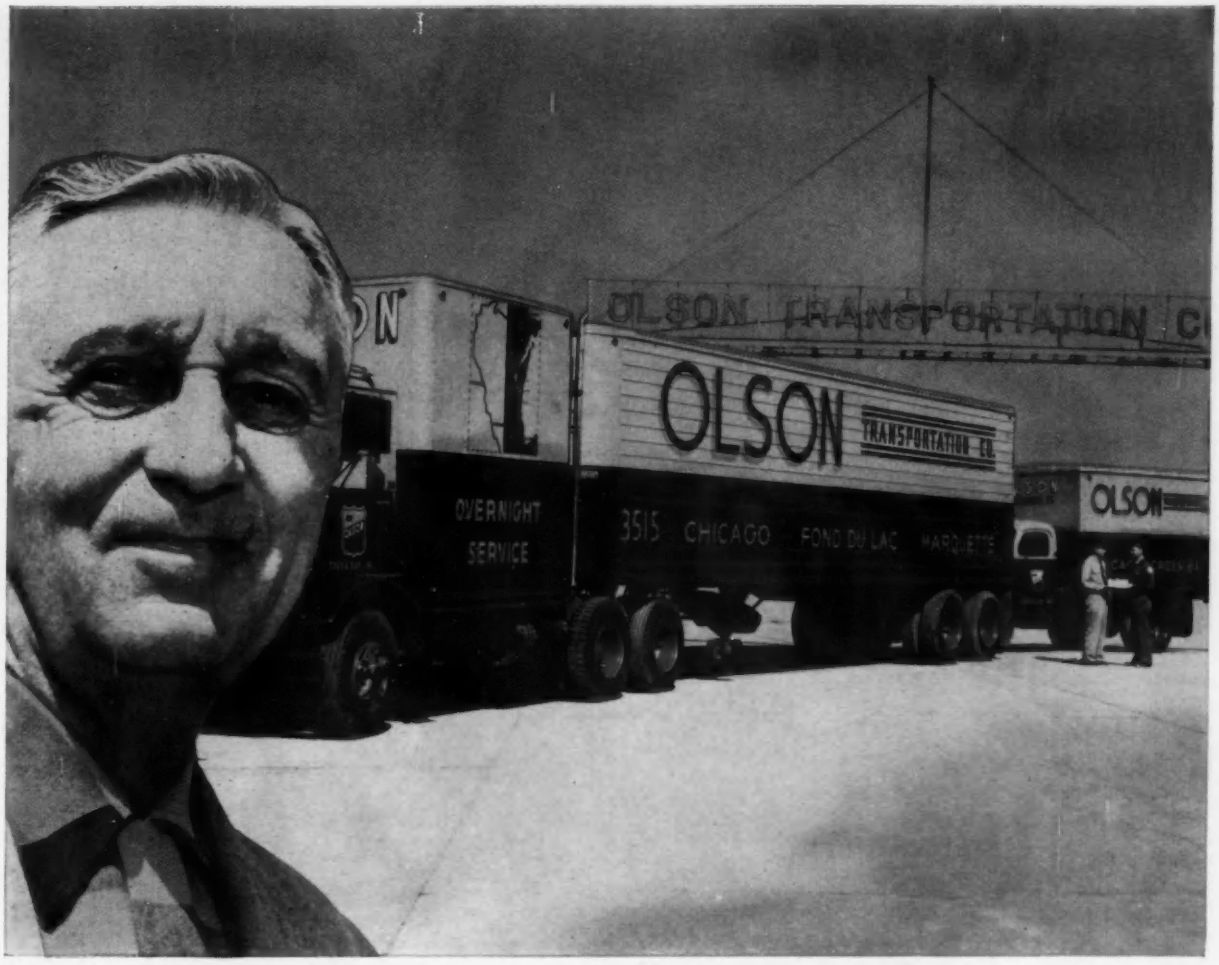
* DuPont registered trademark
**Dow-Corning registered trademark

CHICAGO RAWHIDE MANUFACTURING COMPANY

SIRVENE DIVISION, 1205 ELSTON AVENUE • CHICAGO 22, ILLINOIS
Offices in 55 principal cities. See your telephone book.
In Canada: Chicago Rawhide Mfg. Co. of Canada, Ltd., Brantford, Ontario
Export Sales: Geon International Corp., Great Neck, New York
C/R PRODUCTS: C/R Shaft & End Face Seals • Sirvia-Conpor mechanical leather cups, packings, boots • C/R Non-metallic gears

C/R

Circle 125 on Inquiry Card for more data



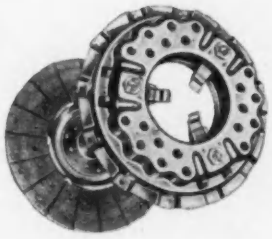
"We average more miles with LIPE CLUTCHES"

says Olson Transportation Co., Green Bay, Wisconsin

M. J. Madigan, Olson Maintenance Superintendent, remarks: "Some time back, we decided to give Lipe Clutches a thorough tryout as interchanges for original equipment. Our records show that they have produced more miles before overhaul than the clutches supplied with our units when new. Needless to say, we are very satisfied with these results."

Measure Lipe Clutch value by any standard you like . . . by ton-miles per year, by number of engagements or miles between teardowns, by vehicle use per repair dollar . . . and you'll agree with reports from all over the country that Lipe delivers more profit-building performance per dollar of cost. That's why . . .

***the trend is to* LIPE!**

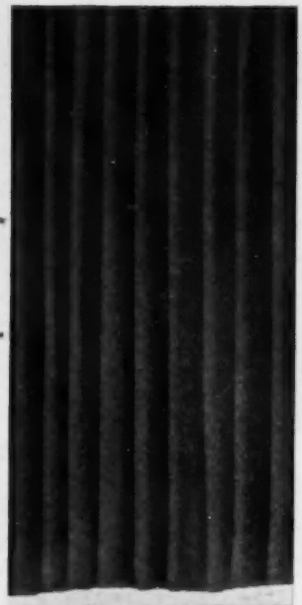


There is a Lipe Clutch to meet requirements of vehicles 18,000 lbs. G.V.W. and up; for torque capacities from 200 to 3000 ft. lbs. For application assistance and specific data, contact the Company direct.

LIPE ROLLWAY
CORPORATION
SYRACUSE 1, N.Y.

Circle 126 on Inquiry Card for more data

THE AMPLEXOLOGIST



The Amplexologist has a high regard for prospective customers' blueprints. He finds it necessary upon occasion, however, to put them respectfully aside. Especially when he's told: "We tried to make this part out of powder metal a couple of years ago but the supplier couldn't meet our specs."

The Amplexologist, you see, has heard this song before. That's why he puts down the prints and picks up the part. And starts probing.

What does this part have to do? Under what conditions? Any special strains? Impact? Where? What about the configuration? Is this contour functional? Are these sharp angles necessary?

Often as not, the answers to these questions hit pay dirt. They usually reveal, in fact, that with a little redesigning another "impossible" part can, after all, be made better and cheaper through advanced powder metallurgy (i.e. Amplexology).

We're happy to say that most manufacturers are eager to eat their own specifications anytime they can save thousands of dollars and still maintain (or improve) quality. Their willing appetite has helped make us the world's largest and most experienced producer of powder metal parts. One more reason why manufacturers say, **When it comes to powder metallurgy—Amplex has the answer.**

A LITTLE RE-DESIGNING . . .

The part shown is an engine fan-pulley hub. It was formerly a solid circular casting. The manufacturer had to machine the face, bore the ID, drill and tap four holes. The Amplexologist re-designed the hub into its present cloverleaf shape—to reduce weight and cost of material. It is now being produced by powder metallurgy as a finished precision part that requires no machining—except tapping the holes. Total savings about 33%.

AMPLEXOLOGIST

SEND COUPON **. . . if you'd like to talk over your product with the Amplexologist. Don't hesitate. He's always happy to get out of the office.**

AMPLEX DIVISION • CHRYSLER CORP. • Dept. A7
P.O. Box 2718 • DETROIT 31, MICH.

Please have the Amplexologist call to look into the possibility of using powder metal parts in our product.

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ **STATE**_____

PRODUCT_____

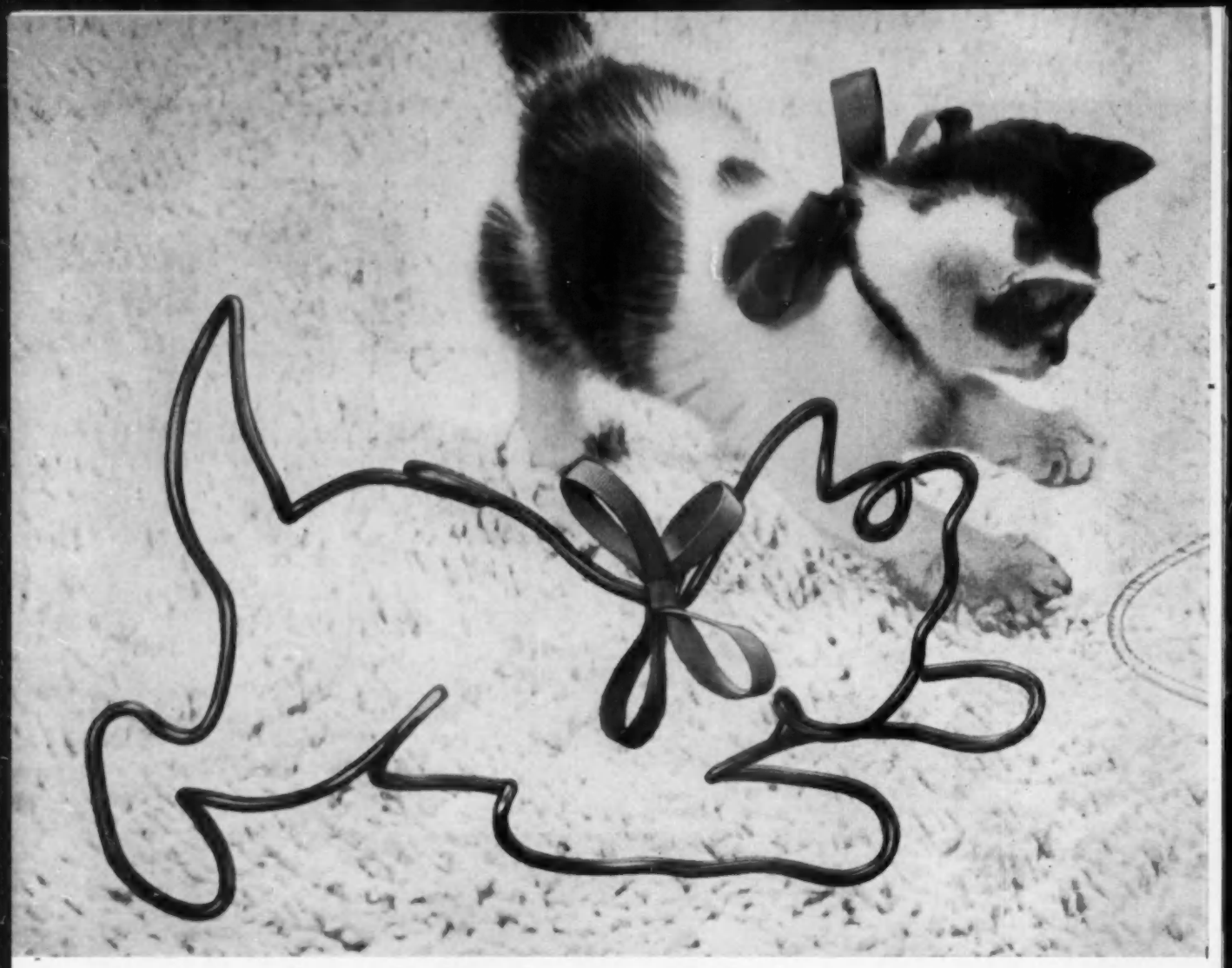
AMPLEX

DIVISION CHRYSLER CORP.

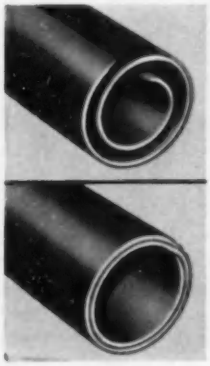
A CHRYSLER OILITE® PRODUCT

Circle 127 on Inquiry Card for more data

Circle 128 on Inquiry Card for more data



There's almost no limit to the things Bundy can mass-fabricate



Bundyweld is the original tubing double-walled from a single copper-plated *steel* strip, metallurgically bonded through 360° of wall contact for amazing strength, versatility.

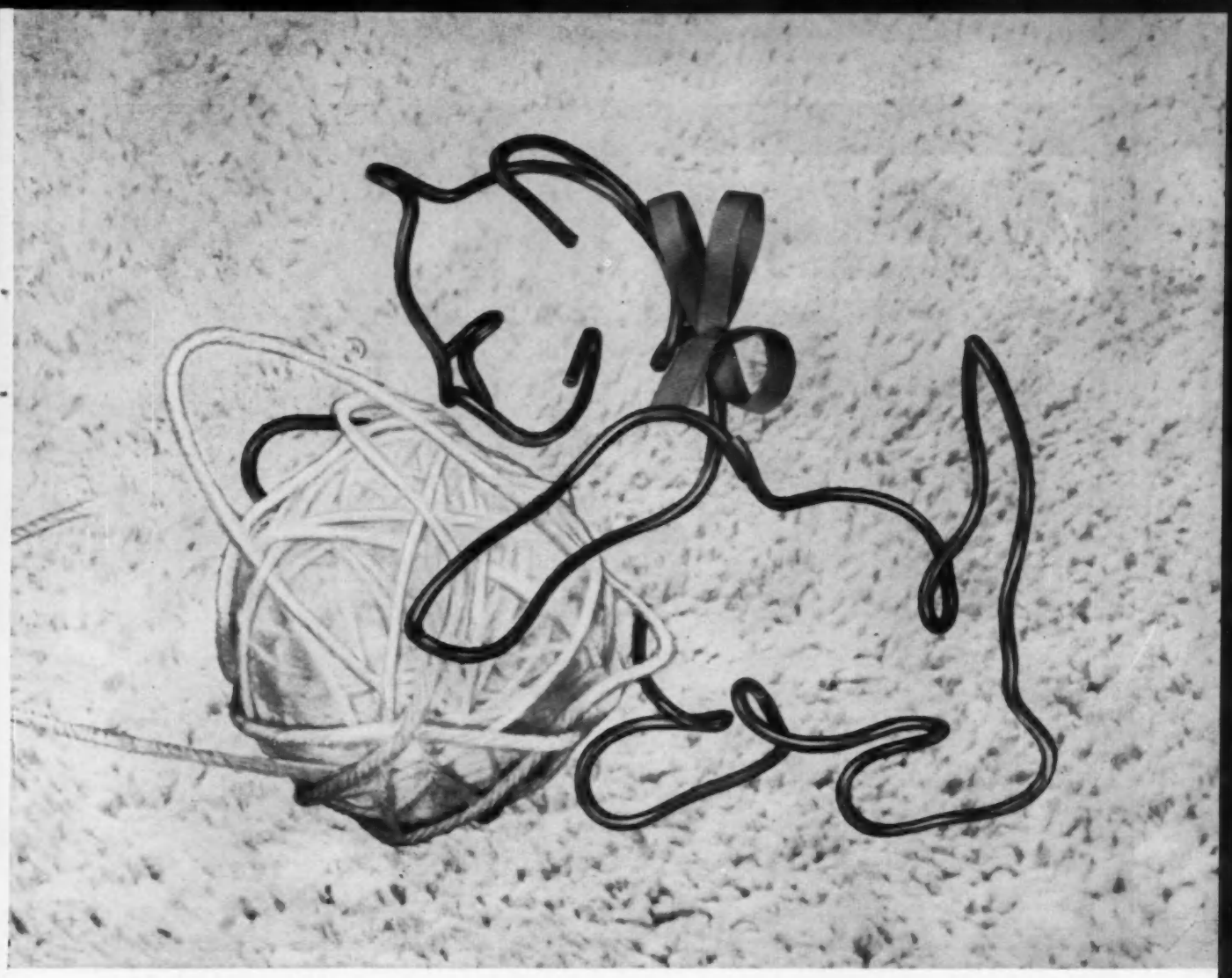
Bundyweld is lightweight, uniformly smooth, easily fabricated. It's remarkably resistant to vibration fatigue; has unusually high bursting strength. Sizes up to ⅝" O.D.

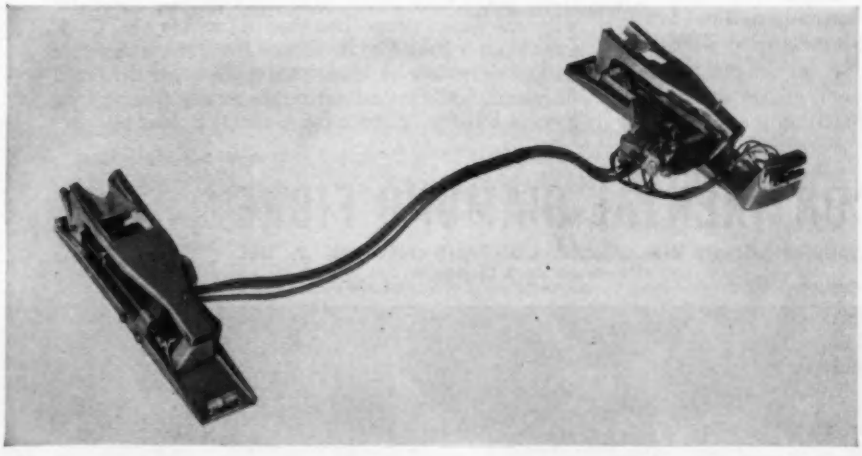
Experience makes the difference! And Bundy engineers, backed by years of experience in designing and fabricating tubing parts, can help you solve your tubing problem.

Bundy engineers will work with you at any time during the development of your product. They may be able to suggest design modifications in your tubing components to cut fabrication costs. Then your design will be turned over to Bundy specialists who will mass-fabricate your tubing parts at low unit cost with Bundyweld®.

Bundyweld is the original steel tubing that's ***double-walled*** from a single steel strip for extra strength and resistance to vibration fatigue. It's the safety standard of the automotive industry. Bundyweld is covered by Government Spec. MIL-T-3520, Type III.

Got a tubing problem? Bring it to Bundy. Call, write, or wire: Bundy Tubing Company, Detroit 14, Michigan.





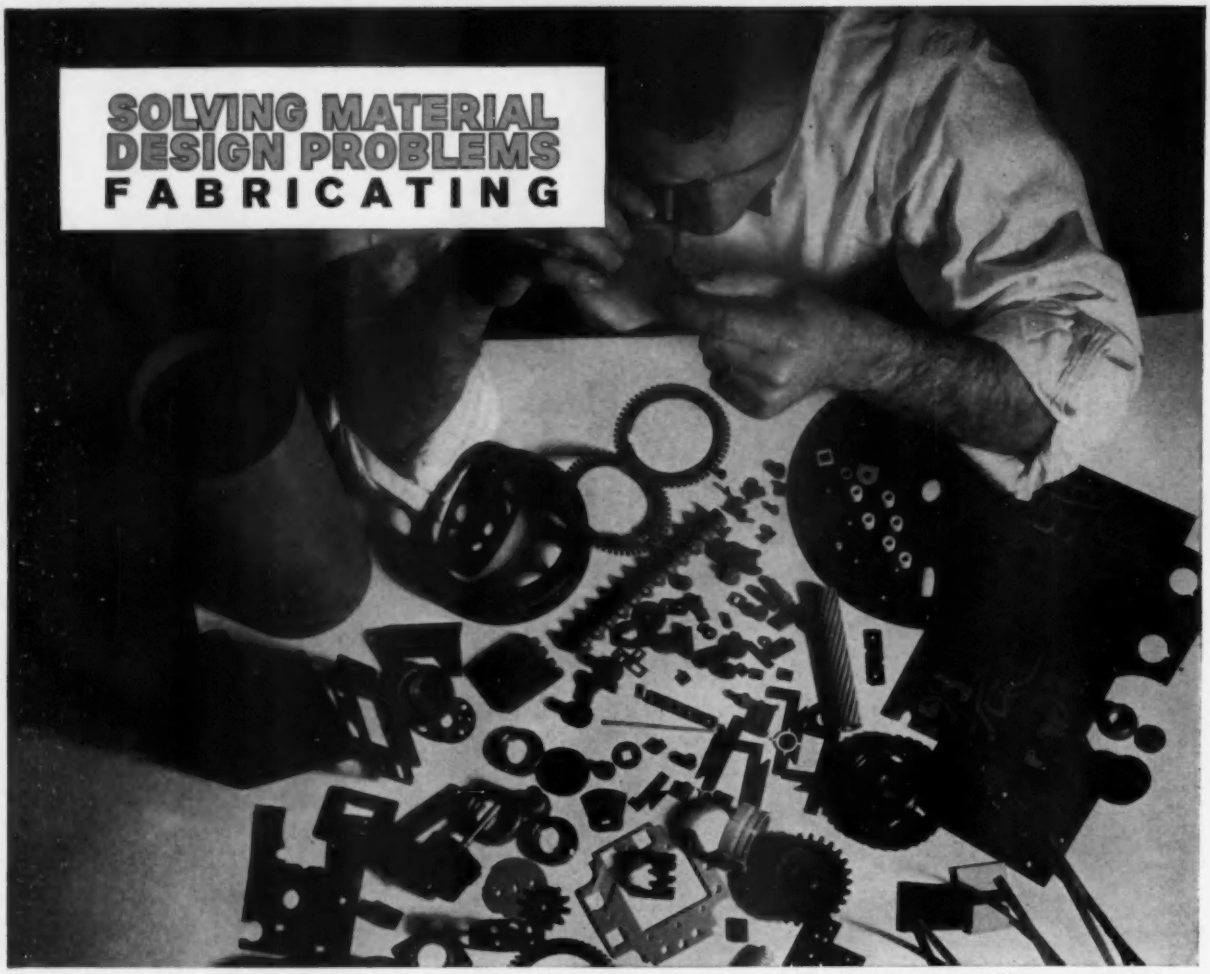
Six lengths of Bundyweld tubing are used as torque tubes to guide and protect the flexible cables that drive the slave units in this power seat unit. The tubes need to be extremely smooth in order to protect the cables from fraying . . . and they have to be easily fabricated and economical, too. Bundyweld tubing meets every requirement!

There's no substitute for the original

BUNDYWELD® TUBING

WORLD'S LARGEST PRODUCER OF SMALL-DIAMETER TUBING • AFFILIATED PLANTS IN AUSTRALIA, BRAZIL, ENGLAND, FRANCE, GERMANY, AND ITALY

BUNDY TUBING COMPANY • DETROIT 14, MICH. • WINCHESTER, KY. • HOMETOWN, PA.



Buy the parts not the problems. From large and unusual shapes to parts so small you inspect with a jeweler's glass... CDF's special fabricating facilities can do your job faster, more economically. Every part shown above is fabricated by CDF, except the etching of the printed circuits.

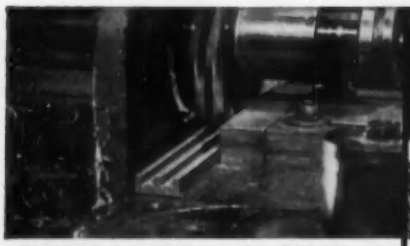
There's an excellent chance you can save on set-up and production time, and reduce unit costs by asking CDF to give you an estimate on final fabrication of laminated plastics, vulcanized fibre and electrical insulating materials.

Our machines, all 2,000 of them, are set up for just one purpose—the forming, machining and molding of the many types of materials that we produce.

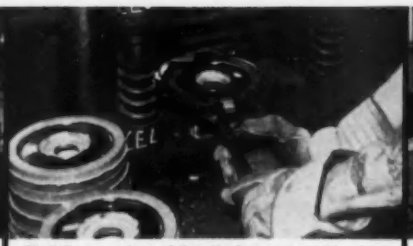
Most important of all, you can combine economy with the exact properties you're looking for. CDF offers you a choice of materials from the industry's widest selection of laminated plastics, vulcanized fibre and electrical insulating materials. Check your Sweets PD file or write for General Folder 60.

CONTINENTAL-DIAMOND FIBRE

A SUBSIDIARY OF THE Budd COMPANY • NEWARK 2, DEL.
In Canada, 46 Hollinger Road, Toronto 16, Ont.



Machining low-cost tracks for sliding glass doors. Made by CDF from Diamond vulcanized fibre. It's tough, yet light in weight.

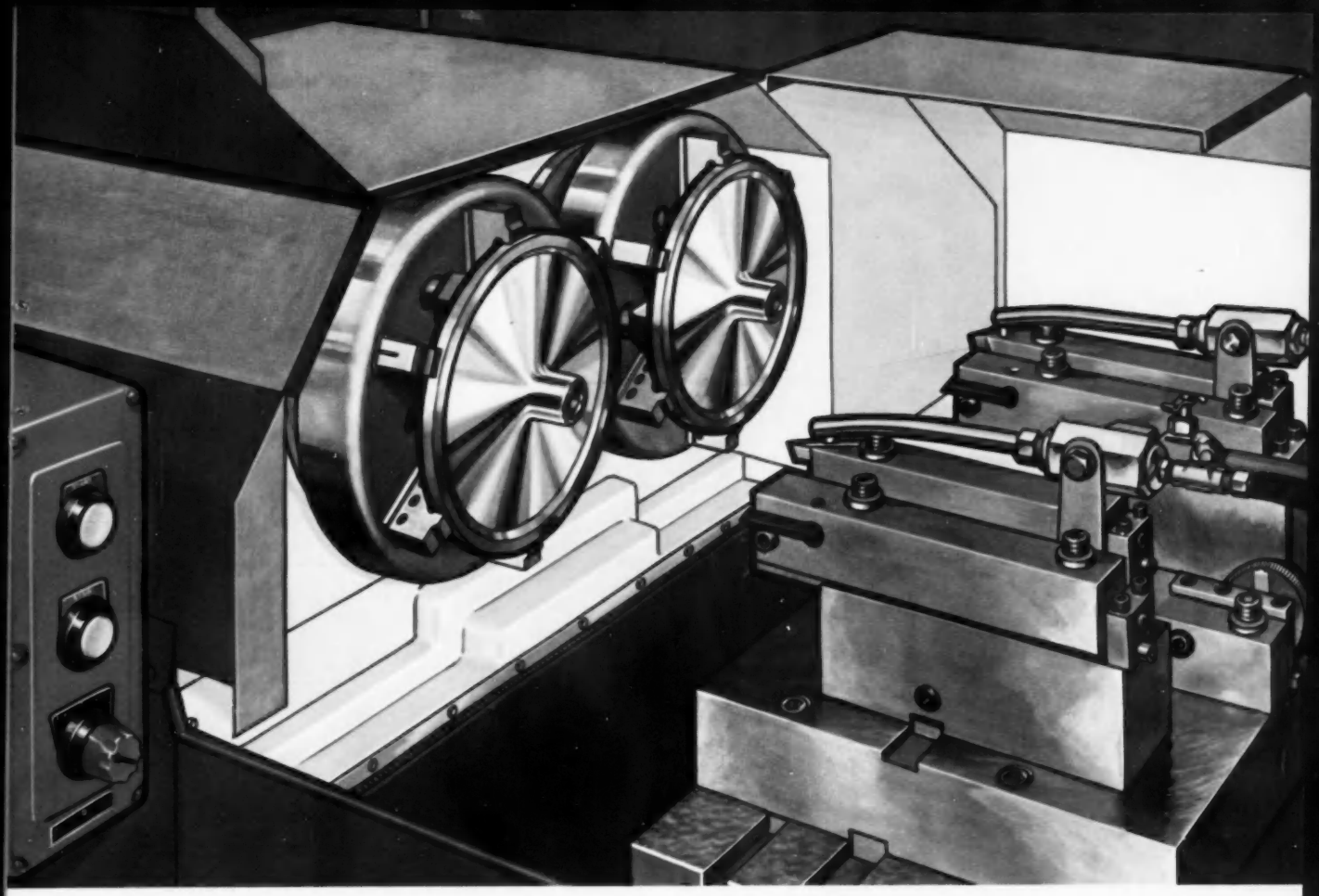


Molding automobile timing gear blanks made from CDF's Celoron molding material for maximum wear and a minimum of noise.

Postforming back-up disc for a sander. Made from a Dilecto laminated plastic to get maximum toughness and resiliency.

Circle 129 on Inquiry Card for more data

Circle 130 on Inquiry Card for more data



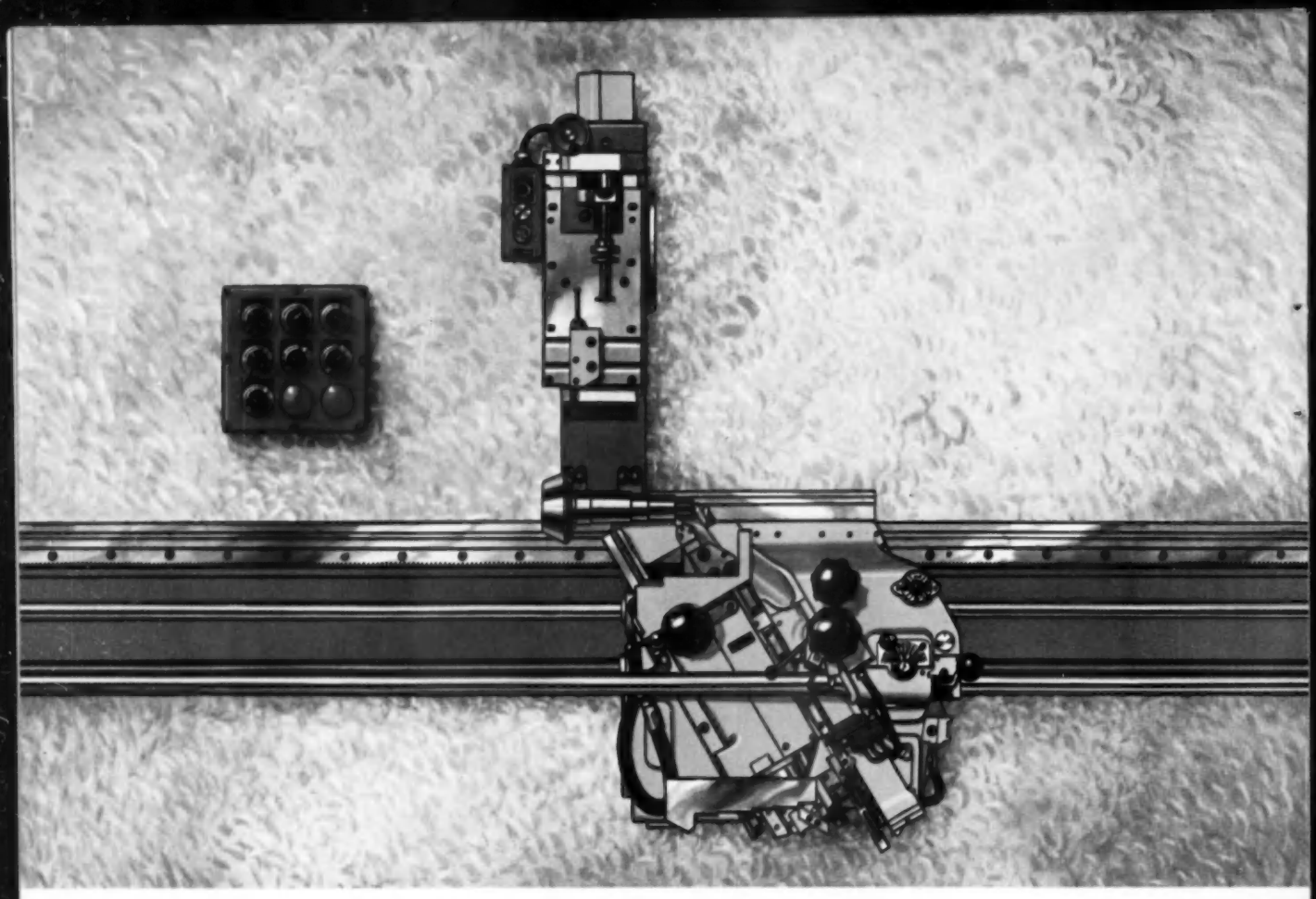
Consistent accuracy to tenths at super speeds

Model 37 Precision Boring Machine is a machine with a mission, rather than an answer to everybody's metal turning problems. Its mission is contour boring and turning in applications where both extreme repetitive accuracy and high production are of paramount importance. If you have such a requirement, Model 37 is an unbeatable money-maker.

It is an inherently simple machine: simple to operate, with inspection limited to gauging any one dimension. Simple in operating principle, too, built around precision cams that operate without being affected by temperature fluctuation. From one to four high speed spindles can be mounted on a single machine.

We would be happy to discuss *any* production problem involving straight or contour boring and turning. We doubt that anyone equals New Britain's know-how in this area, and we have a wide variety of boring equipment, both vertical and horizontal and of very advanced design. No matter what your work, or production requirements, this is a very fine place to look for an answer. The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut.

THE NEW BRITAIN MACHINE COMPANY
New Britain-Gridley Machine Division - New Britain, Connecticut



Fast, rugged New Britain +GF+ copy lathes

Right from the ground up the New Britain **+GF+** is a machine conceived, designed and manufactured as a copying-contouring lathe. Not a standard lathe with copying attachment; not a factory-made "special" with the contouring feature built on components from other lathes; but a solidly based, ruggedly constructed, fast, powerful, accurate machine designed solely for the template-controlled, rapid production of between-centers or chucked work with external or internal contouring.

A million pieces or just a few, it's a machine you'll use on many different types of short-run jobs (just change the template and reset the controls), or on one long-run job (just replace the single-point tool when it wears).

The instantaneously accurate hydraulic copying mechanism is entirely enclosed within the compact carriage. All controls are within easy reach. The template is up front for easy adjustment. The chips fall free into the wide open base, can't clog or jam any part of the mechanism.

There are endless variations available within the New Britain **+GF+** line. The standard model has applications anywhere on between-centers or chucked pieces. Other attachments and models are available to suit your particular requirements; infeed attachments, automatic loading, bar stock models, etc.

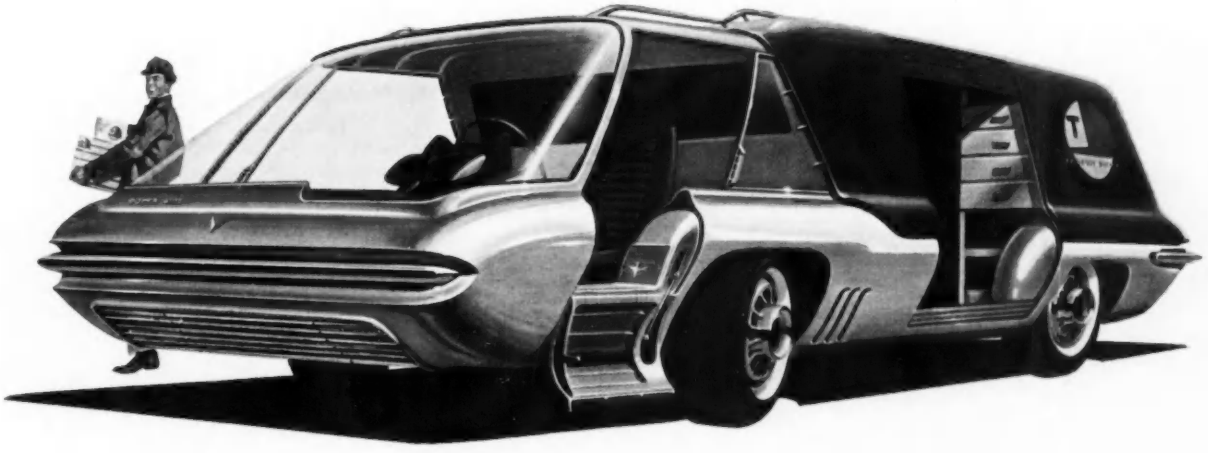
Don't buy any lathe or "special" for copy turning until you have investigated the New Britain **+GF+** copy turning lathe. As a starter, may we send you the latest catalog?

THE NEW BRITAIN MACHINE COMPANY
New Britain-Gridley Machine Division - New Britain, Connecticut

stainless steel

No other metal has the strength, beauty and versatile qualities that serve you so well today and promise so much for tomorrow.

There is nothing like stainless steel for THE AUTOMOTIVE INDUSTRY



McLouth Steel Corporation,
Detroit 17, Michigan

Manufacturers of high quality
Stainless and Carbon Steels

Look for the **STEELMARK** on the products you buy.

McLOUTH STAINLESS STEEL

LOOK FOR THE DIAMONDS—SIGN OF FINISHING QUALITY

NOW—3 ISOBRITE® COPPER PLATING PROCESSES

to fit your operations, your production and cost needs.

ISOBRITE® COPPER #607-622 FULL BRIGHT

Best for high-speed, full-bright finish on zinc die castings, steel, brass or bronze.

CONSISTENT MAXIMUM BRILLIANCE—Primary agent suppresses burning, secondary agent operates well in medium and low current density area; both contribute to overall brightness.

COMPLETE COVERAGE—Covers extremely well in low current density areas. Ideal for parts requiring deep throw; produces plate in deep recesses comparable to buffed areas.

ECONOMY—Plates uniformly over high and low current density areas to save on copper consumption. Easy analysis for brightener level.

ISOBRITE® COPPER #623 GENERAL PURPOSE

Ideal for shops with varied operations. Gives full or semi-bright plate on zinc base die castings, steel, brass or bronze.

EASY-TO-USE—A single addition agent for rack or barrel plating. Easily controlled for desired brightness level.

HIGHLY ECONOMICAL—Use as semi-bright at half the cost of full bright solutions.

VERSATILE—Easily buffed to cover wheel marks. Also brightens well in areas not easily accessible to buffing. Use in rack or barrel plating operations.

ISOBRITE® COPPER #625 BUFF BRIGHT

Produces a very soft plate for quick buffing.

A COMPLETELY ORGANIC SYSTEM—No metallic constituents.

VERY ECONOMICAL—Works well over wide variations of temperatures and concentrations.

EXCELLENT FOR STOP-OFF—Produces plate that resists penetration by heat-treating or case hardening.

VERSATILE—Use in cyanide solutions with or without tartrates, Rochelle salts or proprietary substitutes.

These Isobrite Copper Processes contain no lead and are ready to work as soon as current is turned on, even after week-end shut downs. This means increased production and substantial savings by eliminating poorly plated rejects.

Auxiliary Addition Agents for Added Efficiency and Economy

ISOBRITE #630	Aids anode corrosion for greater efficiency and produces finer grained deposits.
ISOBRITE #631	Chrome reducer. Wide range of operation. Forms no undesirable breakdown products.
ISOBRITE #627-W	Wetting agent. Non-ionic surface agent with low-foaming action.
ISOBRITE #628-W	High detergency type wetting agent for severe organic contamination. All our wetting agents are easily cleaned from parts to give good nickel adhesion.

See your Allied Field Engineer for complete information and recommendations for the specific process that best meets your requirements. He's listed under "Plating Supplies" in the yellow pages. Or, write for FREE TECHNICAL DATA FILES.

Allied Research Products, Inc.

4004-06 EAST MONUMENT STREET • BALTIMORE 5, MARYLAND
BRANCH PLANT: 400 MIDLAND AVENUE • DETROIT 3, MICHIGAN
West Coast Licensee for Process Chemicals: I. H. Butcher Co. • European Agent: Stora Gransberger, Storgatan 10, Stockholm, Sweden

Chemical and Electro chemical Processes, Anodes, Rectifiers, Equipment and Supplies for Metal Finishing

IRIDITE® Chromates | IRILAC® Coatings | ISOBRITE® Brighteners | ARP® Supplies | WAGNER Equipment

Circle 131 on Inquiry Card for more data

Circle 132 on Inquiry Card for more data

NEWS

Vol. 123, No. 2 July 15, 1960

Truck Sales Booming

Present Rate Would Make '60 Second Best

By Hugh C. Quinn, Detroit Regional Editor, and C. B. Campbell, News Editor

The beefy tackle carries a lot of weight on the football team and is necessary in every play. But it is the razzle-dazzle backfield, led by the pint-sized quarterback, that steals all the headlines with spectacular gains and crowd-pleasing dramatics.

And so it seems to be with the automobile industry. The trusty trucks are shoved into the background while the flashy passenger cars, particularly compacts, are grabbing the spotlight with spectacular gains in sales and production.

Second Best Year?

But the trucks are holding their own, and then some. With 1960 half over, truck production stood at 727,721 units, compared with 670,490 a year ago. And reports from individual companies indicate that total retail sales for the year could top one million trucks. In all probability, this will be the second best year in truck history.

As usual, Chevrolet and Ford are leading the field, with more than half the total output between them. Chevrolet built 239,974 trucks through July 2, and Ford built 201,416.

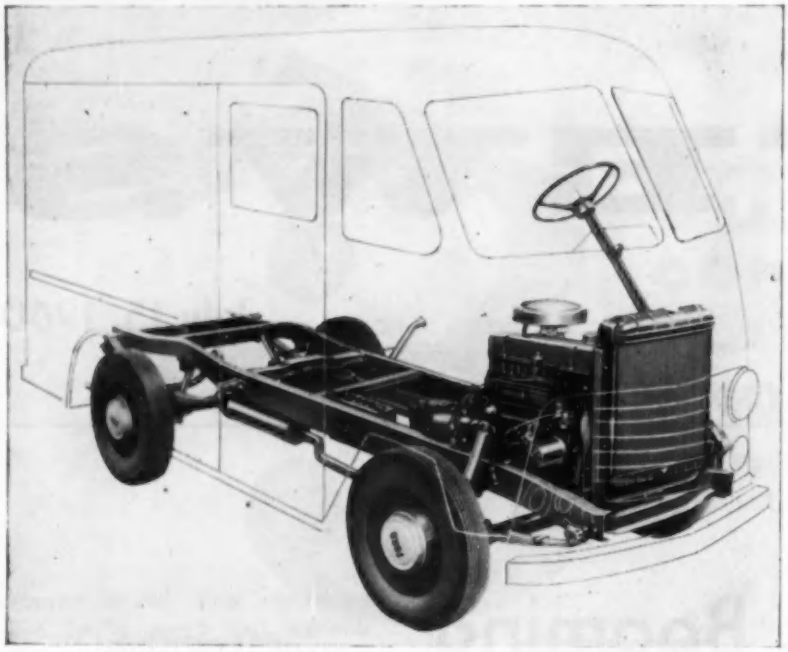
The top six producers, in fact—Chevrolet, Ford, Willys, International, GMC and Dodge-Fargo—produced nearly 96 per cent of all trucks built so far this year in the U. S.

But while total truck production is up from 1959, output in the heavyweight division is down. Dia-

GMC TRUCKS HAVE FOUR-WHEEL DRIVE, V-6 ENGINE

High torque V-6 engines and four-wheel drives feature new GMC trucks for roughest terrain. Offered in half or three-quarter ton models, they also are available as pick-ups or station wagons.

FORD'S SECOND COMPACT TRUCK



Here is the P-100 parcel delivery chassis, Ford's second entry in the compact truck field. It has 96-in. wheelbase and is available with either 90 hp Falcon or standard 139 hp Ford truck engine. It has loading space of 250 cu ft.

mond T, Mack and White all are running behind last year's schedules. So is International, which does a sizable share of its business in highway tractors.

Dodge is the only other major producer with a production drop.

Willys Is Third

One significant change in the standings took place in the first half of 1960. Willys increased production from 62,000 a year ago to 78,000 units, while International dropped from 79,000 to 71,000. This put Willys in third place, ahead of International.

GMC boosted production from 48,454 a year ago to 61,260 to hang onto fourth place, and Dodge-Fargo remained in sixth place despite a production drop of about 2000 units. But Dodge's 42,322 trucks form a wide margin over seventh-place White's 9857 units.

International apparently is concerned about the loss of sales in the face of Willys' sharp increase. According to reports in Detroit, International is planning to meet the new challenge head-on with a new half-ton utility truck, scheduled for introduction shortly after Jan. 1.

The truck, with a four-cylinder engine and optional four-wheel drive, reportedly has many of the features of the military-type vehicle with which Willys has prospered.

Dodge also will attempt to regain some of its lost sales with one new model for 1961. But there are indications that some of the Dodge people are more enthusiastic about their new-found passenger car success than they are about truck business.

Breech Resigns As Ford Chairman

Resignations of two automotive leaders in the last 15 days have left industry observers mystified about the underlying reasons for the moves.

The latest to quit is Ernest R. Breech, 63, who resigned July 13 as board chairman of the Ford Motor Co. He will serve, however, as chairman of the newly-created Finance Committee.

Ford's board of directors named Henry Ford II board chairman. He retains his former position as president.

Mr. Breech, who joined Ford immediately after World War II, was appointed board chairman in 1955. He was given credit for rebuilding Ford during the post-war period.

Other positions Mr. Breech relinquished were chairman of the Administrative Committee and vice chairman of the Executive Committee. However, he remains a member of the Product Planning Committee.

On June 30, William C. Newberg, 49, startled the business world with his resignation as president of Chrysler Corp. just nine weeks after his promotion. A brief statement from the board of directors said only that "his resignation (as president and director) was due to differences of opinion on certain corporate policies." But no one would say what those policies were, or how opinions differed.

L. L. Colbert was elected president to replace Mr. Newberg and E. C. Row was named first vice president. Mr. Colbert continues as chairman of the board and chief executive officer, positions he assumed when he handed over the presidency to Mr. Newberg last April.

Mr. Row, 64, was scheduled to retire this month. Mr. Newberg's unexpected resignation now leaves Mr. Colbert without an obvious successor, since Mr. Newberg was groomed for years to take over as top man.

Mack Announces Plant At Hagerstown, Md.

Mack Trucks, Inc., has announced plans to build a new plant in Hagerstown, Md., to replace its Plainfield, N. J., factory. The new building will be one-story of about a million sq ft. Two thousand are expected to be employed there when the plant opens in October, 1961.

A Mack spokesman said some Plainfield workers would be transferred to Hagerstown. Those not shifted will get separation pay and early retirement benefits, or the company will aid them in finding new jobs.

Answering speculation that Mack's Allentown, Pa., also might be closed, an official said Mack is working out a new contract with Local 677, United Auto Workers, providing for cost concessions to the company. "The company can look to continuance of the Allentown operation indefinitely," the spokesman said.

$47 Million Saving Cited by Republic

Eighteen months of plant-wide cost reduction measures at Republic Aviation Corp have resulted in estimated accumulated savings of some $47 million in the costs of producing the Air Force's Mach 2 fighter-bomber, the F-105D.

The "on-site" savings represent nearly a 32 per cent reduction in costs for fiscal 1960's orders from fiscal 1959. The cost-reduction drive has been joined by 831 firms employing some 40,000 engaged in producing parts and assemblies for the 1400 mph jet.

More than 60 per cent of the fly-away cost of the fighter-bomber is represented in the subcontracted effort. The remaining costs are those incurred by Republic.

As a result of economies achieved thus far and those projected for fiscal 1960, the average unit price of the F-105D will be some $450,000 less than the 1959 price, according to Harley S. Jones, Republic's executive vice president.

Dr. Ference Heads Atmospheric Scientists

Dr. Michael Ference, Jr., executive director of Ford Motor Co.'s Scientific Laboratory, has been appointed chairman of the National Academy of Science's Committee on Atmospheric Sciences.

Organized in 1956, the committee is composed of scientists in meterological and related geophysical fields. Its primary purpose is formulation of a program to accelerate progress in meteorological and upper atmospheric research.

POWER PACK STARTS JET ENGINES

Not much larger than standard automobile filter, this solid propellant-type starter sets off jet engines on supersonic Republic F105-D fighter-bomber. The starter enables the craft to be airborne in seconds. Olin Mathieson Chemical Corp. and Goodyear Tire & Rubber Co. developed the starter.

NEWS

CONTINUED

Imperial Is First To End '60 Production

Imperial was the first domestic passenger car line to end its 1960 production, shutting down June 30 with a total of 17,700 units for the model run. Imperial is scheduled to start up again after the middle of August on '61 production.

But after the 1961 model year, Imperial is not expected to enjoy the exclusive privacy of its own assembly plant. Beginning next year, the Chrysler Corp. luxury line will be built on the same unitized body as the regular Chrysler models, and perhaps will be known as the Chrysler Imperial, as in past years.

This will mean the closing of the recently renovated Imperial plant on Detroit's West Side. The former DeSoto plant was converted and tooled for Imperial production two years ago at a reported cost of $25 million.

Oklahoma Teacher Plans 'Prestige' Cord

A famous old automobile, now seen only in classic car rallies and museums, may be revived and put back into production. A school teacher from Tulsa, Okla., has announced plans to produce a modern version of the front-wheel drive Cord.

Glenn Pray, who teaches automotive classes, has purchased the parts department of the Auburn-Cord Duesenberg Co. of Auburn, Ind. Included in the deal were some 20 trailer-loads of parts, valued at $500,000, plus all remaining blueprints, dies and patterns, full rights to the Auburn and Cord names and partial rights to the Duesenberg name.

Mr. Pray hopes to be in production in about five years on a "prestige" Cord. The first Cord was built in 1929, the last in 1938. Mr. Pray bought the old parts from Detroiter Dallas E. Winslow, who has owned the Auburn-Cord-Duesenberg Co. since 1938.

Hughes to Hire 600

Hughes Aircraft Co.'s ground systems group will hire 600 engineers and scientists during the next nine months.

Phil N. Scheid, Hughes-Fullerton personnel manager, said the current work force at Fullerton, Calif., numbers 6000 working on 26 military contracts.

CITROEN'S STATION WAGON

Air-oil suspension features station wagon that seats eight persons comfortably. It has front-wheel drive, disc brakes and automatic jacking.

Autolite Happy Over Racing Results

Will the American automobile manufacturers ever rescind their "gentlemen's agreement" and return to active participation in racing? Some think it may happen at some time in the future, although there are no concrete indications as yet. But the parts makers are more active than ever.

Ed Stroh, vice president and sales director for Electric Autolite, thinks the heavy car investment is "worth every penny." After five months of stock car participation, Mr. Stroh said, "We've seen enough results already to know our money is being well spent."

He said his company measures the racing program on two counts, whether it helps sales and whether it adds to the research and development program. The racing participation, says Mr. Stroh, is paying its way on both counts.

Gifts to Education Matched by Ford

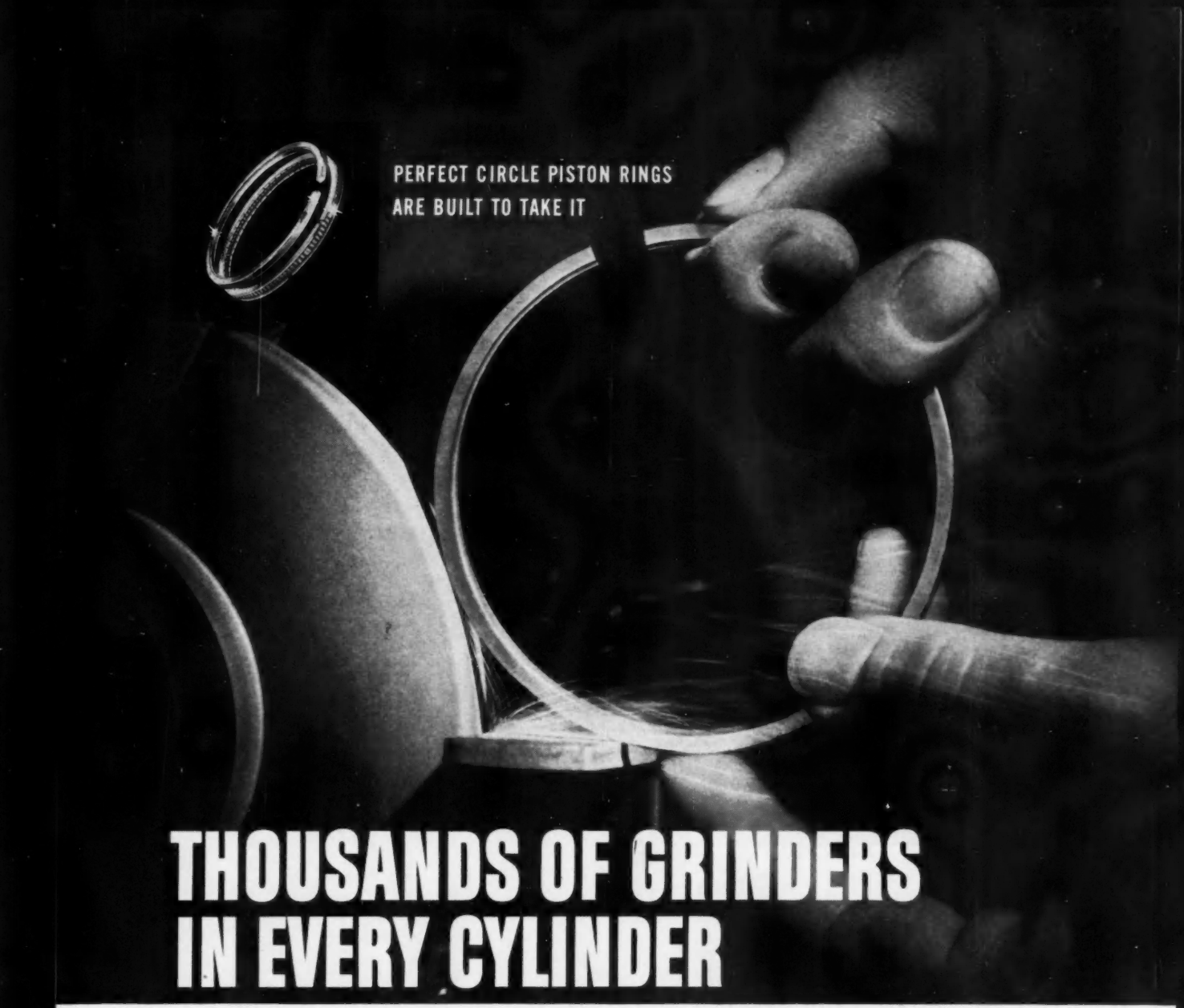
Ford Motor Co. has announced it will match employee contributions to colleges, universities and secondary schools up to $12,000. The program is planned to encourage employee support of schools and colleges, whether or not the employee is an alumnus of the benefiting school.

Henry Ford II said the plan should help broaden the base of support for education and give the schools greater resources upon which to draw.

Aerospace Earnings Show Sharp Decline

Earnings of the aerospace industry declined sharply in 1959 to eight per cent of its net worth, Orval R. Cook, president of the Aerospace Industries Association, has disclosed. The average of national manufacturing earnings is 9.6 per cent.

Mr. Cook said the major reason for the earnings drop was the precipitous decline in production of manned aircraft for military use.



THOUSANDS OF GRINDERS IN EVERY CYLINDER

Dirt particles in a cylinder act just like tiny grinding wheels to wear away the face of a piston ring. To protect against this abrasive wear, Perfect Circle 2-in-1 rings are plated with solid chrome—the hardest, longest-wearing surface you can buy.

As a result, wear is reduced an average of 75% over non-plated rings. And, Perfect Circle's chrome plating is 25% thicker than the average of competitive plated rings to provide extra protection and extra life.

In every way, Perfect Circle rings are built to take it. Insist on Perfect Circles—first choice of leading engine manufacturers and mechanics everywhere.

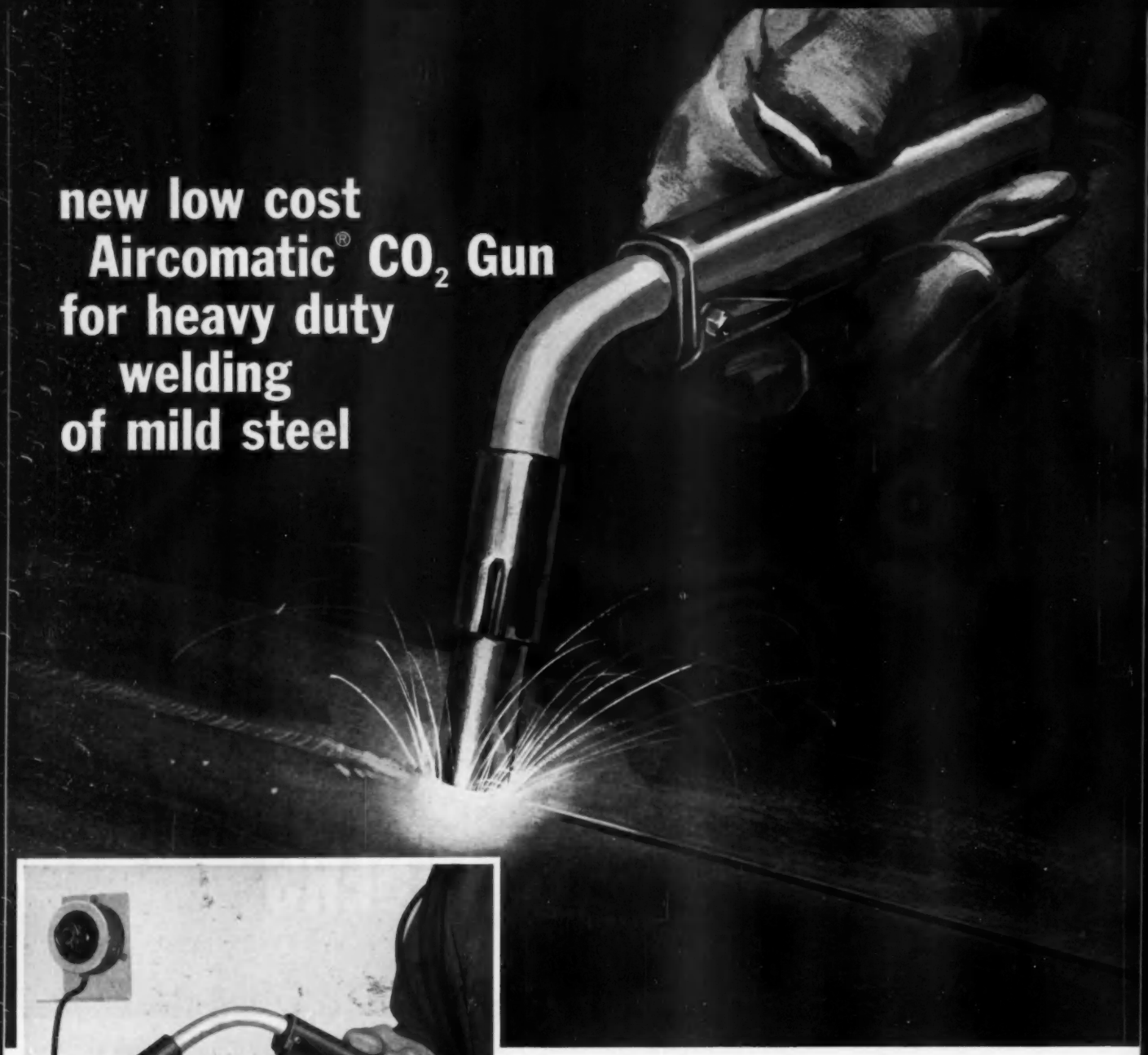
PERFECT CIRCLE

PISTON RINGS · PRECISION CASTINGS · POWER SERVICE PRODUCTS · SPEEDOSTAT

HAGERSTOWN, INDIANA • DON MILLS, ONTARIO, CANADA

Circle 133 on Inquiry Card for more data

new low cost Aircomatic® CO_2 Gun for heavy duty welding of mild steel



LOW COST—New Aircomatic AH60-B Gun and AHF-D Wire Feeder are simple, inexpensive—and expendable parts can be replaced without tools. They're for use especially where rough treatment is the rule. Rating: 600 amps continuous duty DC, with CO_2 buried arc. Wire speeds: 100-600 ipm; wire sizes: .035-3/32". Goose-neck nozzle helps get at hard-to-reach places.

Airco makes the most complete line of manual and automatic gas-shielded arc welding equipment: welders . . . wire . . . gases . . . equipment and accessories. And Airco has the know-how to help you get the most out of these products. For better welding, count on Airco's experience. For details—call Airco.

AIRCO®

AIR REDUCTION SALES COMPANY

A division of Air Reduction Company, Incorporated

150 East 42nd Street, New York 17, N. Y.

More than 700 Authorized Airco Distributors Coast to Coast

On the west coast—
Air Reduction Pacific Company

Internationally—
Airco Company International

In Cuba—
Cuban Air Products Corporation

In Canada—
Air Reduction Canada Limited

All divisions or subsidiaries of Air Reduction Company, Inc.

Circle 134 on Inquiry Card for more data

Now you can get standard sizes in C/R End Face Seals!

Chicago Rawhide now announces the availability of a complete new line of Standard End Face Seals to meet the widest possible range of sealing requirements. For sizes or conditions beyond the range of Standard End Face Seals, C/R engineers will continue to cooperate with you on special designs. Their experience in sealing applications is unmatched — your assurance of getting the correct seal for the job.

Write for your free copy of this new C/R Bulletin ⟶

Bulletin EF-100 includes complete envelope space data on C/R Standard End Face Seals and mating rings to help you select the correct size for your equipment design:

- Size range table in two series — long and short — from ¾ to 4 inch shaft diameter.
- Size range table on mating rings.
- Typical seal installations for internal and external pressure.
- Special instructions on how to order.

C/R

CHICAGO RAWHIDE

CHICAGO RAWHIDE MANUFACTURING COMPANY
1205 ELSTON AVENUE • CHICAGO 22, ILLINOIS
Offices in 55 principal cities. See your telephone book.
In Canada: Manufactured and Distributed by Chicago Rawhide Mfg. Co. of Canada, Ltd., Brantford, Ontario.
Export Sales: Geon International Corp., Great Neck, New York

C/R PRODUCTS: C/R Shaft and End Face Seals • Sirvene (synthetic rubber) molded pliable parts • Sirvis-Conpor mechanical leather cups, packings, boots • C/R Non-Metallic Gears

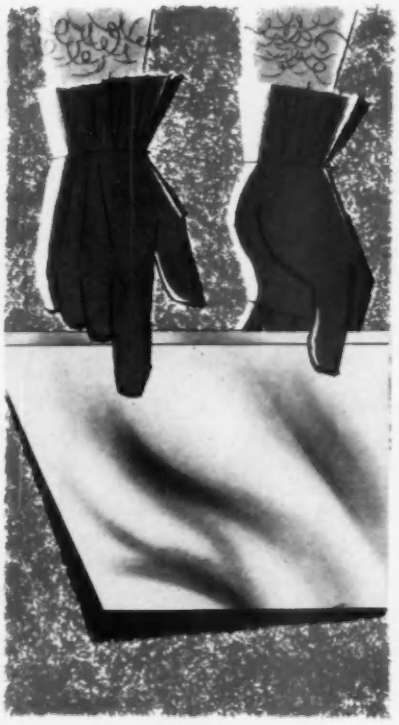
Circle 136 on Inquiry Card for more data

USS Amerstrip—everything about its method of manufacture has the stamp of precision. Just specify what you need in a cold rolled strip, whether it's a precise gauge, finish, edge, tolerance or temper and you get exactly what you specify. USS Amerstrip will keep your product quality high and consistent because of these six distinct advantages:

USS AMERSTRIP GIVES YOU PRECISELY

PRECISION FINISH

With USS Amerstrip we take special pains to give you a finish that is just right for the specific results you require in a finished product. We believe the Amerstrip finish is the finest you can get in the industry.



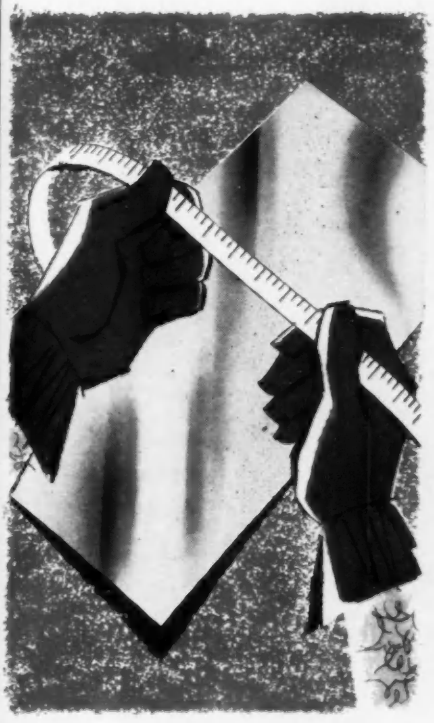
PRECISELY PREPARED EDGES

Because USS Amerstrip is produced in order-sized quantities engineered to your own specifications, we can give you precisely the edge finish you need. Choose your edge—square, standard, round, full round or bevel.

PRECISE TEMPERS

Whether your product must go through a deep draw or undergo other stringent forming operations, or if it requires a special temper for rigidity, you'll always get the correct temper for the job when you order USS Amerstrip.

WHAT YOU NEED IN A COLD ROLLED STRIP



PRECISE WIDTH TOLERANCES

When your fabricating machines require a special width strip, you can be sure that's the width you'll get with Amerstrip. We can produce USS Amerstrip within required tolerance limits to fit your special requirements.

PRECISE THICKNESS TOLERANCES

Whatever thickness tolerance your machines demand, you'll get it in Amerstrip. And it'll be precisely the same in every inch of Amerstrip ordered. Amerstrip can be rolled in thickness tolerances of plus or minus .0005 inches.

PRECISE UNIFORMITY

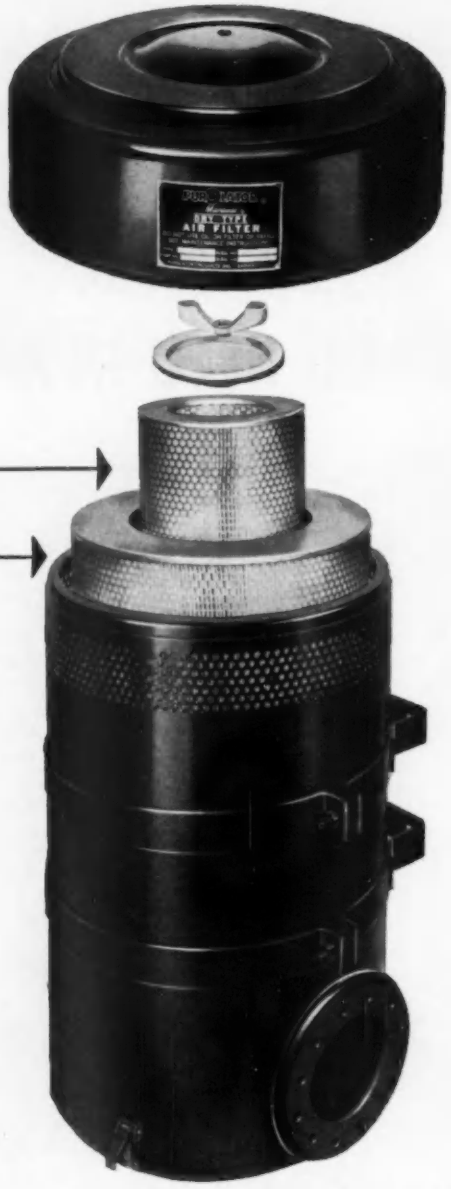
Regardless of the size of your order, every coil of USS Amerstrip comes off the line uniform in finish, temper, width and thickness. In short, USS Amerstrip's precision production assures a continuous run and high yield.

American Steel & Wire Representatives have the training and experience to give you expert guidance in fabrication and application of USS Amerstrip. They can show you how it contributes to a better finished product. To avail yourself of their services, call your nearest AS&W District Office. American Steel & Wire, 614 Superior Ave., N.W., Cleveland 13, Ohio.

USS and Amerstrip are registered trademarks

American Steel & Wire
Division of
United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
Tennessee Coal & Iron Division, Fairfield, Ala., Southern Distributors
United States Steel Export Company, New York



an element here

and an element here

assures 99.98% filtration efficiency even when 1 element is out of operation

IT'S THE NEW PUROLATOR TWO-STAGE FILTER

Simplicity of design makes the first cost of Purolator's new dry-type two-stage filter as low as any two-stage filter on the market. Each element filters independently, and together they dustproof your engine as no other filter can . . . 99.98% efficient.

Users save money and get better engine protection from this new Purolator filter, too. The first stage element will last up to 2000 hours, depending on operating conditions. The second stage will usually last almost indefinitely if the first element and sealing gaskets are maintained properly.

Another big user-advantage is the way the two-stage design protects the engine despite accidental mishandling of the element. Even if the first stage element is damaged, the chance of harming the engine can be discounted when it is protected with the second stage back stop element. In addition, the second stage element lets the operator service the unit in the field, regardless of how dusty the conditions are.

Both elements filter uniformly, in depth, over their whole surface, because they're both precision made of plastic impregnated cellulose. This series of two-stage filters is rated from 450 to 1150 cfm, with exceptionally low initial restriction. Mounting straps, rainhoods and outlet adapters are available.

For more information write to Purolator Products, Inc., Department 3896, Rahway, New Jersey.

Purolator Products, Inc.
Dept. 3896, Rahway, New Jersey

Please send me complete data on the new Purolator two-stage filter series.

Name_____ Title_____

Company_____

Address_____

City_____ Zone_____ State_____

Filtration For Every Known Fluid

PUROLATOR

PRODUCTS, INC.

RAHWAY, NEW JERSEY AND TORONTO, CANADA

Circle 135 on Inquiry Card for more data

NEWS

FEATURES

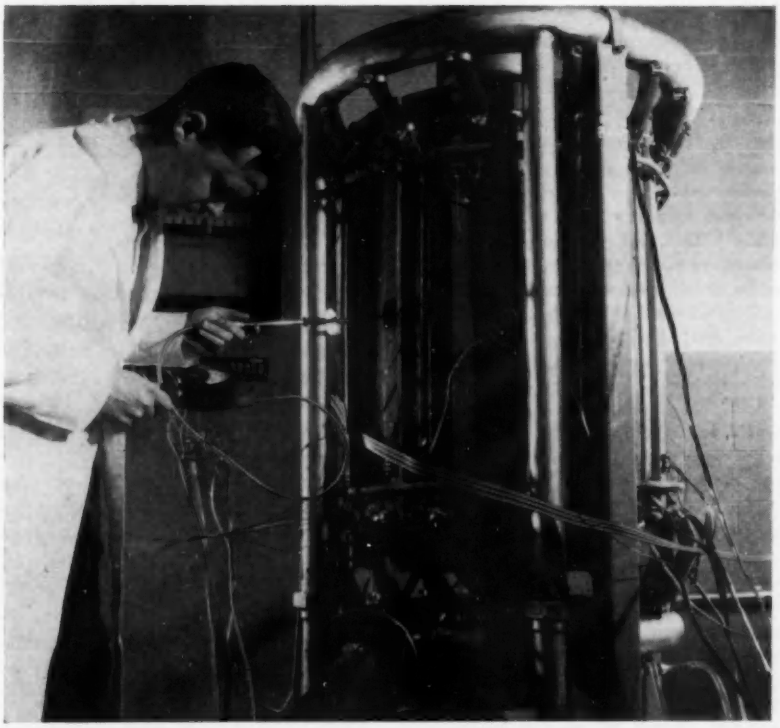
Rough Terrain Crane Developed by Army

A 20-ton capacity rough terrain crane, designed for a variety of applications, including operation in four feet of sea water, is being tested at the Army Engineer Research and Development Laboratories, Fort Belvoir, Va.

The crane is expected to be able to travel highways, under its own power, at 30 mph, climb 40 per cent grades at 2.25 mph, negotiate 10 per cent side slopes, and, by using maximum front and rear steering, turn inside a 30-ft radius.

A unique feature is a special system which permits inflation and deflation of the tires while the vehicle is standing still or is in motion.

LARGEST THERMOELECTRIC POWER PLANT



A sub-generator, one of two which make up the largest thermoelectric power plant ever built, is being tested at Westinghouse. Developed for the Navy, the generator will be used to evaluate materials.

AMA Votes $1.7 Million For Traffic Safety

The directors of the Automobile Manufacturers Association have approved grants totaling $1,706,000 for the coming fiscal year to promote traffic safety and efficient use of highways, President L. L. Colbert has announced.

Such grants have been made annually by the motor vehicle manufacturers for more than two decades, supplementing the industry's multi-million dollar safety research and engineering activities. This will be the seventh consecutive year in which the grant total has exceeded one million dollars.

The largest AMA grant—nearly one million dollars—will be made to the Automotive Safety Foundation, a national organization providing financial aid and technical assistance for highway safety activities throughout the country.

Supported by industry since its inception, the foundation has received more than half its funds from motor vehicle manufacturers. During the 23 years of ASF activity, the national traffic fatality rate has declined from 15.2 deaths per 100 million miles of travel to a low of 5.4 in 1959.

Wylie Is Elected

Frank W. Wylie, director of public relations for Dodge Div., Chrysler Corp., has been elected chairman of the Motor Truck Public Relations Committee of the Automobile Manufacturers Association.

TABLOID

Sales of U. S. goods abroad increased considerably in the first three months of 1960. Non-military shipments, totaling $18.4 billion, showed the greatest strength in more than two years. The year earlier total was $15.4 billion.

* * *

Manufacturers' shipments of passenger car tires during March amounted to 8,578,397 units, a decrease of 3.66 per cent below the 8,903,922 tires shipped in February. Production of passenger car tires in March rose to 9,679,058 units, a rise of 3.29 per cent over February output of 9,370,874 tires.

* * *

A new, adhesive-like material, designed as a protective coating for roof gutters, metal flashings and corrugated galvanized roofing, also can be used as an economical automobile undercoating. Called Pliogrip 12-3, it is claimed to be highly resistant to oils, chemicals and organic acids.

* * *

Fourteen technical memorandums prepared by the Defense Metals Information Center, Battelle Memorial Institute, have been published for sale to industry. The center was established at Battelle at the request of the Assistant Secretary of Defense for Research and Eugineering to provide information on titanium, beryllium, refractory metals, high-strength alloys for high-temperature service, corrosion and oxidation resistant coatings, and thermal protection systems.

* * *

Publication of a monthly report on radiological health data prepared by the Public Health Service has been begun by the Office of Technical Services, Business and Defense Administration, U. S. Department of Commerce. The report contains statistical information on current radiation levels in air, water, milk, and other foods as reported to Public Health Service by Federal, state and local agencies.

During 1958, manufacturers in the aircraft engines industry shipped products valued at $3351 million, an increase of five per cent over 1954. Average employment in the industry showed a decrease of 11 per cent. Value added by manufacturers amounted to $1524 million, an increase of 17 per cent over 1954.

* * *

The Navy has released four research reports on stress and crack potential of welded steel plate, including crack inspection by radioisotopes.

* * *

During 1958, manufacturers in the machine tools industry shipped products valued at $698 million, a decrease of 40 per cent from 1954. Average employment in the industry showed a decrease of 33 per cent in the same years. Value added by industry manufacturers amounted to $431 million in 1958, a decrease of 42 per cent from 1954.

* * *

Since July 1, 1956, construction contracts have been completed on 5997 miles of the national system of interstate and defense highways at a cost of $2.51 billion. As of March 31, construction was under way on 4805 miles at an estimated cost of $3.04 billion. Included in the program were 4951 bridges completed and 4900 under way. In addition, $2.35 billion has been authorized or spent for preliminary engineering work and acquisition of right-of-way since July 1, 1956.

* * *

"Ram induction" of the fuel-air mixture offers extra power for passing without reducing fuel economy in normal driving, according to Chrysler Corp. engineers. Sonic impulses traveling inside manifold tubes push extra fuel and air into the cylinders. The system can be "tuned" for a fairly narrow range of engine speeds where added torque and horsepower are desired.

B-58 Rocket Catapult Tested Successfully

The first test of the complete rocket-catapult assembly for the escape system of the Convair B-58 Hustler supersonic bomber has been fired successfully at the Bristol, Pa., plant of Thiokol Chemical Corp.

The escape capsule being designed by Stanley Aircraft Corp. for Convair is unique in that the seat of each crew member becomes an enclosed escape capsule designed to protect him against high speeds and high altitude ejection, as well as to provide a habitable environment on land, sea or ice.

Self-contained radio equipment is provided to locate the capsule for rescue craft. Flight simulation and rocket sled tests of the escape capsule are under way at Hurricane Mesa, Utah, by Stanley. Flotation tests are being conducted off Key West, Fla.

Engineering Center Opened by M-F

Massey-Ferguson, Inc., opened a new engineering center in Detroit on July 1, expanding the company's engineering capabilities by 65 per cent. The new center, adjacent to the M-F Detroit tractor plant, will employ 500 engineers.

Herman G. Klemm, M-F vice president of engineering, says the center will be used for research and design of tractors, balers and other mechanized farm equipment for production in M-F plants in Detroit and other parts of the world. The main goal of the new facility will be to speed work toward world-wide standardization of farm equipment specifications, according to Mr. Klemm.

Tinted Glass Found 30 Degrees Cooler

Tests have shown tinted glass keeps an automobile up to 30 degrees cooler in hot weather. Chrysler Corp. engineers revealed that when a car is parked in the sun for some time the rate of heat build-up is several times less if the auto is equipped with tinted glass.

The tests also disclosed that ordinary glass transmitted 78 per cent of the total solar energy it received, and absorbed or reflected only 22 per cent. Heat-absorbing glass, on the other hand, transmitted only 45 per cent of solar heat and absorbed or reflected the remaining 55 per cent.

Underwater 'Tank' Can 'Swim' Now

A "lift appendage" that will enable a tank-like vehicle to "swim" underwater has been designed for the Navy's new remote-controlled underwater vehicle by Hughes Aircraft Co.

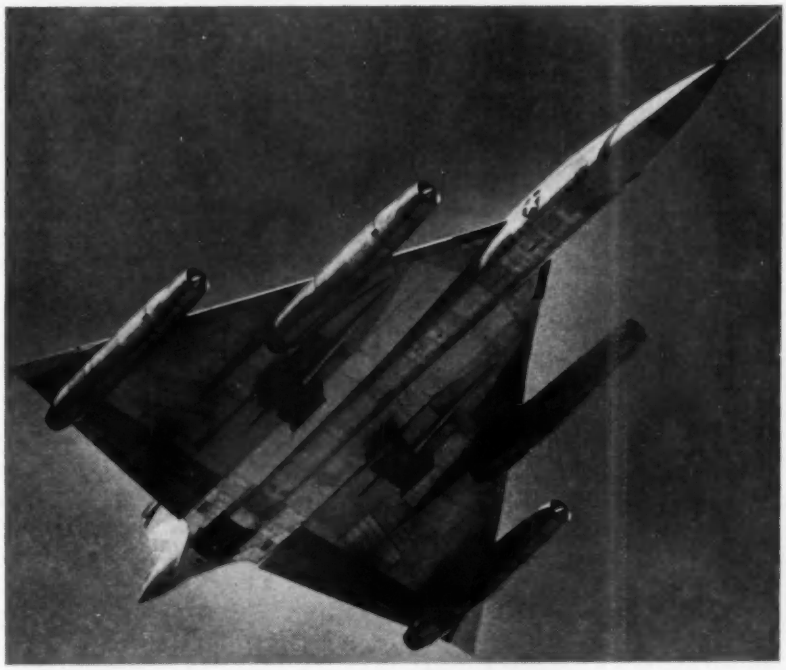
The device essentially is an "underwater helicopter" with rotor blades that will permit the vehicle to perform tasks now impossible for man at 20,000 ft. under the sea.

The engineering and design study of the lift device was done under supervision of T. F. Fletcher of Hughes Nuclear Electronics Laboratory under contract for the Navy's Rum (remote underwater manipulator). The latter is a tracked vehicle developed for the Office of Naval Research by the Marine Physical Laboratory of Scripps Institution of Oceanography of the University of California, La Jolla.

The vehicle presently crawls along the ocean bottom, but when it is equipped with the Hughes lift appendage, it will be able to raise or lower itself in the water, move sideways, hover like a helicopter or "float." This will enable the vehicle to perform a wider variety of man-like tasks such as installing oceanographic instrumentation and scientific equipment at 100 to 20,000 feet in depth.

The lift will handle an immersed weight up to 8,000 lb, propel it in any direction and stay submerged in salt water for months without damage to its metal materials, according to Dr. John W. Clark, manager of the Hughes Nuclear Electronics Laboratory which designed the device.

NEW TRAINER VERSION OF B-58 HUSTLER



First flight of B-58 bomber is shown as Convair tests new trainer. Crew compartments are different from earlier models in that either a pilot-in-training (first station) or the pilot-instructor may fly the supersonic craft.

More Study Urged In Aviation Safety

The Cornell-Guggenheim Aviation Safety Center has declared "eight important areas" in aviation safety are not now being adequately studied and called for "further research, development, or special monitoring" to promote greater flying safety.

Although substantial progress has been made in safety research since 1958, the center said areas such as altimetry, collision avoidance, crash fire protection, occupant protection, weather forecasting, subsonic research facilities, private flying and human factors are still receiving insufficient attention.

EUROPEAN ROUND-UP

By DAVID SCOTT • Special Correspondent

With British motor production already at a record annual rate of 1.5 million cars and 450,000 trucks, the industry is pushing ahead with further expansion plans.

Most recent announcement comes from GM's Vauxhall, which has acquired a 400-acre site at Merseyside, near Liverpool, as the next step in its program to boost yearly output to 400,000.

This move ties in with the government's decentralization policy to create employment in pockets of surplus labor, which will involve a major geographical distribution of industry away from southern England.

Ford Plans Changes

Following the same pattern, Ford also plans a large integrated passenger car factory in the Liverpool area, while shifting most of its truck assembly from Dagenham to Langley, far on the other side of London, and its tractor production to Basildon.

B.M.C.'s current $140 million program to raise total production from 750,000 to one million units by 1960 involves new major factories in Scotland and Wales.

Rootes, too, has its sights on Scotland. Rover intends to build an additional assembly plant for Land-Rovers in Wales.

Standard-Triumph's new assembly building at Coventry is nearing completion, and the company has earmarked $50 million for a body factory in Liverpool.

Jaguar's acquisition of Daimler puts it in the ranks of Britain's "big five," and will make expansion possible without having to move out of Coventry.

Suppliers Shifting

Component suppliers to the major auto producers are following suit to meet the demand. Pressed Steel is extending its Glasgow factory to make car bodies. Hepworth & Grandage will establish an additional plant for pistons and rings in northeast England.

Triplex Glass and Hardy Spicer are others on the band wagon. Big orders for machine tools have caused a boom in that sector.

But while home sales and exports have hit record levels, the picture is clouded by Britain's waning fortunes in the United States—Its No. 1 overseas market for cars which last year took 39 per cent of exports and 17.5 per cent of total production.

With U. S. figures for April continuing the downward trend in most imported registrations except Volkswagen, United Kingdom producers are getting uneasy about the future. Looking ahead, they are even more worried by Detroit's forthcoming European-sized models, and the effect they may have on British sales in Canada and other markets as well as in America.

Push Light Trucks

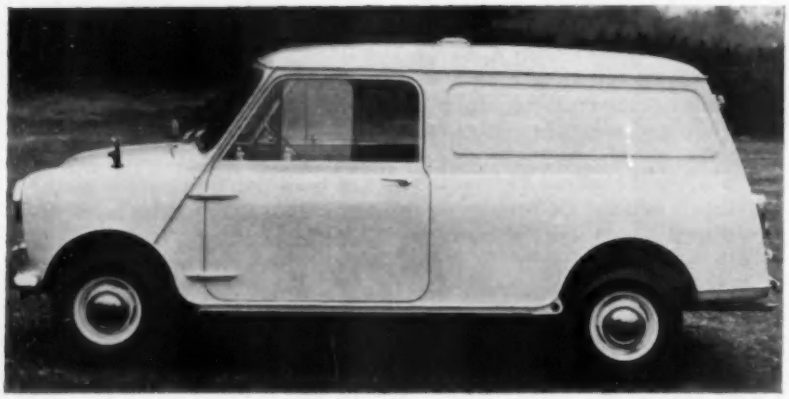
Yet the industry regards this setback as transitory, and is renewing its drive in Europe and Commonwealth areas. At the same time, hitherto-neglected light panel trucks are viewed as potential sellers in the United States.

Rootes recently introduced its three-quarter-ton cab-over-engine Commer line, and B.M.C. will soon launch a quarter-ton version of the Austin and Morris 850.

Elsewhere in Europe, Opel and German Ford, affected by dwindling shipments to America because of rivalry from the parent companies' compacts, also are probing alternative outlets.

Independent German manufacturers, however, are still optimistic about the U. S. Aiming at increasing North American business, Mercedes-Benz is working on an automatic transmission for its cars.

Likewise eyeing America, Citroen is devising a stylish body for its small "2VC," a very popular austerity model in France where it is known as the "ugly duckling."



Light panel trucks similar to this Austin and Morris 850 may soon be seen in the U. S. market. The 850 has transverse engine combined with gearbox and differential. The 51.74-cu in. four-cylinder engine develops 34 hp at 5500 rpm.

Accidents Rare At Proving Grounds

Real accidents are rare at automotive proving grounds.

Skilled drivers, strict regulations and top-notch maintenance of both roads and vehicles give these huge automotive test areas nearly perfect safety records.

Planned "accidents" are another matter.

Scientifically-controlled collisions and roll-overs of all types are staged at the proving grounds on a continuing basis as an important part of regular testing programs. From such "accidents" engineers obtain valuable information to help them make cars progressively safer.

The Automobile Manufacturers Association reports that since 1953 nearly every type of highway crash situation has been duplicated in hundreds of proving ground crashes.

The tests, completely recorded by electronic instruments and ultra-high speed motion picture cameras, are providing engineers with first-hand information about both vehicle and occupant behavior under crash conditions. Electronically-wired dummies are used to trace the exact sequence of collision events and to disclose any injury-producing contact with vehicle interiors.

Supplementing the planned "accidents" are a multitude of laboratory tests for individual car components. The specially designed equipment used in these tests duplicates the forces and stresses of a real collision.

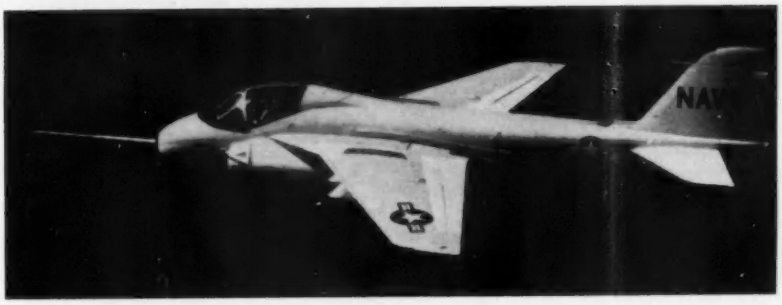
Motor vehicle manufacturers also make use of scientifically processed data from actual highway accidents. These data are obtained from the crash injury research program of Cornell University which receives financial support from the AMA.

Industry engineers carried out simple crash and roll-over tests as early as 1933. The most extensive crash injury research, however, has been conducted during the past seven years along with the development of recording instruments.

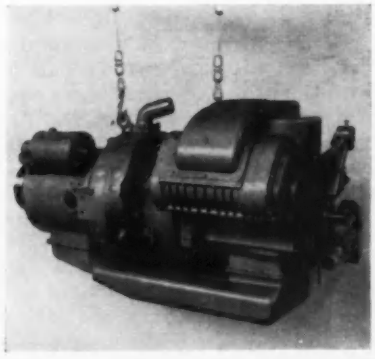
Tests of improved safety door latches under actual crash conditions led to their adoption as standard equipment in 1956.

The design and construction of many other vehicle safety features in recent years have resulted from crash test data. Such features include recessed-hub steering wheels, automotive seat belts, better seat and seat cushion retention, improved instrument panel designs, stronger roof suppport pillars and more effective energy-absorbing safety padding.

NAVY ATTACK BOMBER DISPLAYED



The Grumman A2F-1 Intruder, carrier-based low level attack bomber, has been unveiled at Calverton, N. Y. The two place craft has an extended range and can be used for close support missions regardless of weather or darkness.



Six-cylinder two-cycle Diesel engine prototype developed by Novi Diesel Engine, Inc., is claimed to be adaptable for many uses.

Autolite Planning Alabama Plant

Electric Autolite will build a multi-million dollar plant in Decatur, Ala., for production of light automotive and industrial electrical parts that are now made in Toledo. Robert H. Davies, Autolite president, says a total investment of $6 million to $7 million will include an 80-acre tract and a 250,000 sq ft plant.

Autolite will continue to manufacture some items, including starting motors and generators, in Toledo. But automotive production will fall off during the next two months when a contract with Chrysler Corp. expires.

Imported Tires Increase

Imported tires topped a million units for the first time last year. This was more than double the 1958 total of 490,000 imported tires.

Rapid growth of the foreign car market was the main reason for the increase according to G. Raymond Cuthbertson, vice president, United States Rubber Co. In contrast, he said, U. S. tire exports have decreased from more than 2 million in 1955 to 1.5 million a year for the last two years.

(*Turn to page* 91, *please*)

CASE HISTORIES

N/D integral rolleron gyro wheel and shaft with precision instrument ball bearing solves sidewinder reliability problem. Actual ball bearing O.D. measures little more than an inch.

Designs Reliability Into Sidewinder Rollerons!

CUSTOMER PROBLEM:
With ever-increasing speeds of new fighter aircraft, the rollerons of this aircraft-fired missile failed because they were subjected to environmental conditions more severe than those for which originally designed.

SOLUTION:
New Departure engineers in conjunction with Naval Ordnance Test Station solved the problem by recommending a simplification of the original rolleron assembly. An integral gyro wheel and shaft was designed that maintains critical rolleron reliability. What's more, the new design reduces inventories, assembly time and inspections. And today, this same N/D creative engineering and reliability can be found in more than twenty of America's major missiles . . . in airframe, guidance, propulsion and ground support.

If *your* product has unusual ball bearing demands, call in a New Departure Sales Engineer. He's armed with a complete line of Miniature, Instrument and standard ball bearings . . . one that's sure to do the job for you! Write Dept. L.S., New Departure Division, General Motors Corporation, Bristol, Conn.

NEW DEPARTURE
BALL BEARINGS
proved reliability you can build around

Circle 137 on Inquiry Card for more data

MEN IN THE NEWS

General Motors Corp., Euclid Corp.—V. L. Snow has been appointed general manager.

Imperial Brass Mfg. Co. — Charles Sutton has been named manager of product development.

Heil Co., TEC Div. Joseph A. Waite has been named assistant sales manager.

Firestone Tire & Rubber Co.—M. R. Batche has been appointed safety manager for all manufacturing plants.

Dow Chemical Co., Dobeckmun Co. Div.—Stefan P. Boran has been appointed director of styling research.

Goodyear Tire & Rubber Co.—W. J. Lee (left) has been appointed director of tire research and development and A. J. Gracia has been named director of general research and development.

Oakite Products, Inc. — **Lon E. Welch** has been transferred to Kokomo, Ind., as technical field representative; **George E. Park** has been named Springfield, Mo., representative, and **James D. Enstad** has been named as representative in St. Paul.

General Motors Corp., Fisher Body Div.—**John C. Owens** has been appointed general factory manager of assembly plants in the Eastern U. S. and **Earl Hayward** has been promoted to manager of the Willow Run plant.

Hughes Aircraft Co., El Segundo Mfg. Div.—**S. Vaughan Andrews** has been named personnel manager.

Heppenstall Co.—**Charles T. Heppenstall** has been appointed manager, specialty product sales.

General Motors Corp.—**Lloyd F. Christenson** has been appointed director of sales engineering.

Ford Motor Co., Aeronutronic Div. —**Claude E. Brotherhous** has been named assistant manager of Systems Test and Prototype Fabrication for Tactical Weapons Systems Operations.

Pittsburgh Plate Glass Co.—**Ralph V. Reisgen,** vice president of glass manufacturing, has retired.

Studebaker-Packard Corp., Export Div.—**Dewey W. Smith,** one of the industry's most widely-traveled salesmen, has retired.

Hughes Aircraft Co. — **John H. Richardson** has been promoted to vice president-marketing.

General Motors Corp., Pontiac Div. —**John F. Blamy** has been appointed director of reliability.

Chrysler Corp., Amplex Div.—**William P. Balthrop** has been named president.

General Motors Corp., Allison Div. — **Edgar G. Davis** has been named manufacturing manager; **Hugh C. Kirtland** has been appointed quality control manager; **William J. Purchas, Jr.,** has been appointed chief engineer-applications, and **Paul J. Lindley** has been named reliability manager.

Bendix Corp.—**Dr. D. M. Allison** has been named technical assistant to the vice president of engineering and research.

General Motors Corp., Chevrolet Motor Div.—**Robert M. Sigler** has been named assistant manager of the national truck department.

Borg-Warner Corp., York Div.—**Joseph B. Elliott** has been named president and general manager.

Firestone Tire & Rubber Co.—**E. R. Horch** has been appointed division manager of manufacturers sales.

Eaton Mfg. Co.—**Thomas A. Moretti** has been promoted to special assistant, Industrial Relations Dept., and **Malcolm Daisley** was named employe relations manager.

Republic Aviation Corp. — **Dr. Hanns S. Wolff** has been named chief of the Electronics Laboratory.

Chrysler Corp.—**C. J. Quinlan** has been appointed group purchasing agent for Power Train Mfg. Group.

Necrology

Francis C. Reith, 45, president of the Crosley Div. of AVCO Corp. and a former Ford Motor Co. vice president, died July 3 in Cincinnati.

Daniel L. Pierron, 58, a Chrysler Corp. engineer for 20 years, died July 1 in Detroit.

Raymond J. Kraemer, 64, senior vice president and director of steel purchases of R. C. Mahon Co., died June 30 in Detroit.

John Crawford, 69, former assistant to the late Edsel Ford, then president of the Ford Motor Co., died June 26 in Sturbridge, Mass.

Edward A. Peterson, 75, a retired Chrysler Corp. foundry division executive, died June 22 in St. Clair, Mich.

William H. Roberts, 42, executive vice president of Detroit Stamping Co., died June 21 in Detroit.

Louis F. Surridge, 60, assistant general manager of Curtiss-Wright Corp.'s Utica Div., died June 19 in Pontiac, Mich.

10 years from now . . .
this cab will still look like new

because it's made of

MOLDED FIBER GLASS

It won't be rusted or corroded—MOLDED FIBER GLASS is unaffected by weather, salt and most chemicals.

It won't be dented or out of shape—MOLDED FIBER GLASS is highly resistant to impacts. (Severe impacts cause local damage only . . . easily and quickly repaired. There is no distortion of adjacent parts.)

10 years from now this MOLDED FIBER GLASS cab will have been one of its fleet's biggest money-makers. It will have hauled considerably more payload than metal cabs of comparable size, because its MOLDED FIBER GLASS parts weight up to 40% less than metal . . . and are contour-molded to shorter dimensions.

Right now is the time to get complete information on having *your* designs custom molded of strong, lightweight MOLDED FIBER GLASS.

Tooling for MOLDED FIBER GLASS takes 50% less time and costs 80% less than for metal. Write today.

MOLDED FIBER GLASS BODY COMPANY
4611 Benefit Avenue, Ashtabula, Ohio

GREATEST NAME MOLDED FIBER GLASS IN REINFORCED PLASTICS

an Editorial

Cooperation versus Criticism

THE ADEQUACY AND TOTAL CAPABILITY of America's national defense establishment is one of the most important assets of the country. While there may have been individual mistakes and errors of judgment in the handling of some details of the total program, in the main the Defense Operations of the United States have been exceptionally well managed. It is certainly not in the interest of the advancement of the public welfare for this vital program to be made a "football of politics," either now or at any future time.

EVERY CRITIC OF THE DEFENSE PROGRAM has many well established and effective routes for presenting critical comments, remarks and suggestions. Experience shows that responsible critics can be expected to be given a complete and adequate hearing for their remarks. It is doubtful, however, whether any "lay critic" can have such a comprehensive knowledge of all of the factors involved in any important single segment of the total program, as to offer completely objective criticisms which are entirely free from bias, error or unwitting misjudgment.

EVERY CITIZEN HAS A BASIC RESPONSIBILITY to participate in no action which tends to harm public opinion and national morale, while the so-called "Cold War" continues. Indeed, his responsibility is very clear in a more positive way—to use every effort to refuse to participate in actions which undermine public confidence in the national defense effort, at all times.

EARLY IN 1960, CERTAIN OBJECTIVES were clearly stated to industrial and engineering leaders, as to the aims of the defense program which would be fulfilled when the new budget period arrived. One of these objectives was to improve and modernize the defense vehicle facilities. With the funds now looming ahead, this program will undoubtedly go ahead.

ON THE TOPIC OF THE REORGANIZATION of the General Staff, here too is an example of a subject on which consultative advice is welcomed by the Administration. There is no need to make this a subject for public controversy. Probably no perfect system of staff operation has yet been devised for any public or private organization. Almost all such operations must be improved by gradual change, innovation and advances, rather than in the introduction of a complete new concept in one drastic step. While the "Cold War" continues, it is important for everyone to divorce political actions, attitudes and propositions from comments and discussions of the National Defense organizations of the country. Certainly everyone can expect that Republican and Democrat alike will place cooperation in the public interest ahead of every partisan and political consideration. That route is the effective path to continuous, adequate National Defense progress.

Hartley W Barclay

Editor and Publisher

SEALED POWER
Stainless Steel
OIL RING...
this new metal delivers unique performance

Sealed Power's stainless steel oil ring stops smoking in high compression engines—maintains its original, built-in tension.

The oil ring expander (being of stainless steel) resists the pitting and etching effects of the gases of internal combustion engines. The surface stays clean and smooth; return oil vents do not plug.

Stainless steel has no significant tension loss at engine operating temperature. This means the expander continues to exert the proper, predetermined pressure on the side rails. They, in turn, have the proper scraping action against cylinder walls far longer.

Other key features: proper cylinder wall conformability • quick seating • chrome-plated side rails for long life • easy assembly and installation.

Sealed Power

Preferred Performance

SEALED POWER CORPORATION,
MUSKEGON, MICHIGAN • ST. JOHNS, MICHIGAN
ROCHESTER, INDIANA • STRATFORD, ONTARIO
Detroit Office • 7-236 General Motors Building
Phone Trinity 1-3440

PISTONS • PISTON RINGS • SLEEVES
SLEEVE ASSEMBLIES • SEALING RINGS
FOR ALL APPLICATIONS

U. S. Pat. No. 2,789,872
Stainless Steel Oil Ring

Circle 138 on Inquiry Card for more data

At Willys Motors Inc., a wholly-owned subsidiary of Kaiser Industries, Inc., purchasing is headed by L. S. MacKay, Vice President in Charge of Procurement

Purchasing for World-Wide Willys Manufacturing Needs

By

L. S. MacKAY

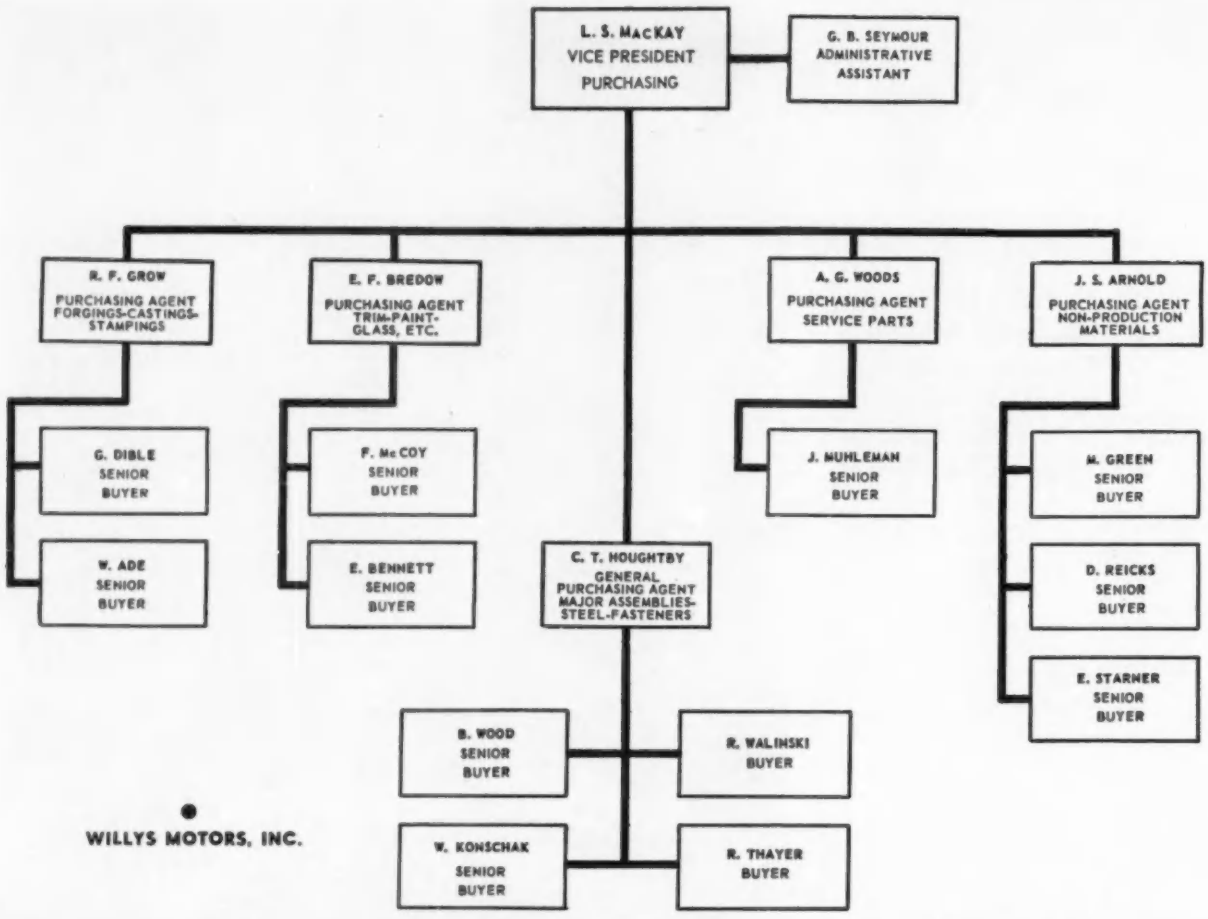
Vice President in Charge of Procurement

WILLYS MOTORS, INC.

TODAY'S narrow cost-price relationships are continuing to place greater responsibility on purchasing as a key cost control point in every industrial organization.

In all manufacturing, procurement represents the greatest single factor of cost, and in the automotive industry it is greater than all other factors combined. Obviously, then, the procurement functions present great potentialities for waste and loss, as well as correspondingly great opportunities for savings and profit.

Purchasing is a service function—not an end in itself, but a means to enable converting departments to produce a finished product at a proper cost and to enable the sales divisions to sell competitively in today's markets both at home and abroad. Accordingly, procurement



PURCHASING

must be closely associated with the activities of Engineering, Production Planning and Scheduling, Manufacturing, Traffic, Finance and related divisions of management responsibility.

The world's largest manufacturer of four-wheel drive vehicles—Willys regularly buys some 6500 parts and assemblies for manufacture of the "Jeep" family of vehicles, a line which includes 12 basic models on a range of six wheelbases.

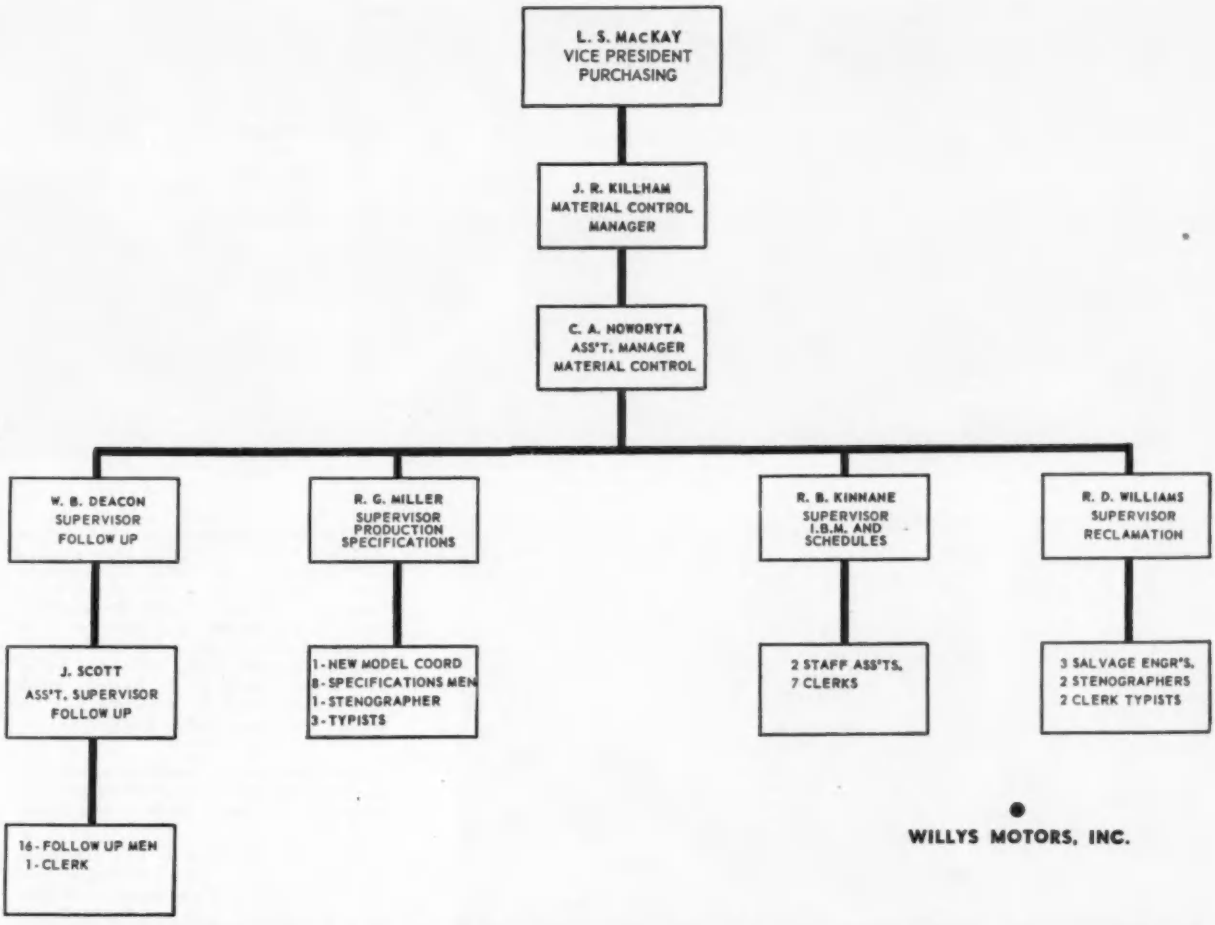
Buys for 22 Foreign Plants

To support this production program, the company spends in excess of 100 million dollars annually for purchased parts, materials and services. Involved are approximately 1000 production and 2500 non-production suppliers who produce almost every conceivable industrial product. In addition to procurement for the Toledo manufacturing operation, Willys also is the U. S. purchasing agent for the world-wide network of 22 foreign "Jeep" vehicle assembly and manufacturing plants in which Willys is a partner.

Helps Build Other Plants Abroad

The company occupies a rather unique position among U. S. automotive manufacturers in that a substantial portion of its annual volume is concerned with overseas operations. Aside from supplying production material for overseas manufacture, the Procurement Division also negotiates license and technical agreements with American suppliers for manufacture of their products in Willys-affiliated foreign plants for "Jeep" vehicle production. Paralleling this program the Procurement Division also encourages and makes arrangements for American automotive parts manufacturers to establish overseas plants to facilitate "Jeep" vehicle output in countries where there is little or no automotive parts industry.

An illustration of this type of activity occurred when it became apparent to Willys Motors' South American Affiliates (Industries Kaiser Argentina and Willys-Overland do Brasil) that insufficient forging capacity existed in both countries to satisfy projected production requirements. Accordingly, over a period of time, MacKay surveyed the U. S. forging industry with a view to stimulating the interest of one or more American forging companies in establishing forging plants in both countries.



MATERIAL CONTROL

This resulted in a joint project between Industrias Kaiser Argentina and Steel Improvement & Forge Company, Cleveland, under which a completely equipped forging facility of approximately 75,000 sq ft of floor space and costing in excess of $2 million was established at Cordoba, Argentina. This new facility will permit I.K.A. to provide its requirements of forgings for a wide variety of requirements in manufacturing its full line of "Jeep" vehicles and passenger cars. It will produce 10,000 tons of forgings annually, ranging in size from a few ounces to several hundred pounds, by the end of 1961. At that time this facility will be producing more forgings than required by I.K.A.'s automobile manufacturing, and a limited quantity of forgings will be available for other Argentine industries such as railroads, ship building, and aircraft.

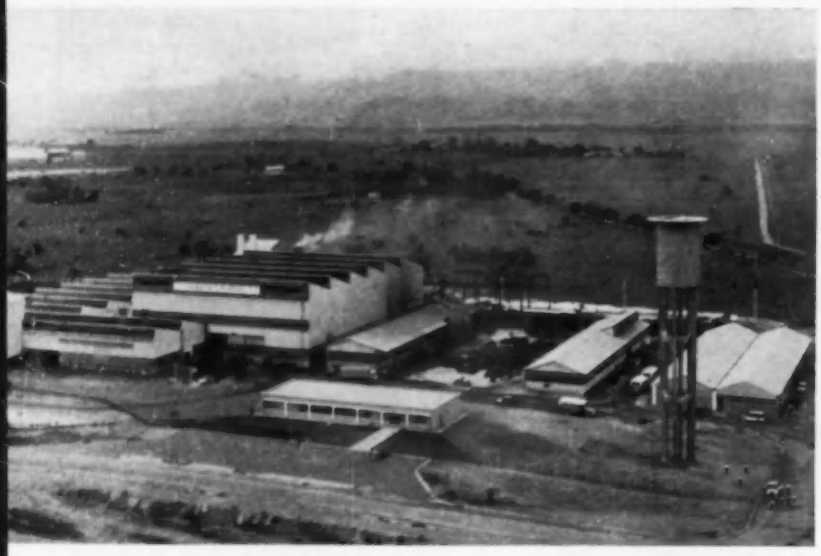
A "First" in Brazilian Forged Parts

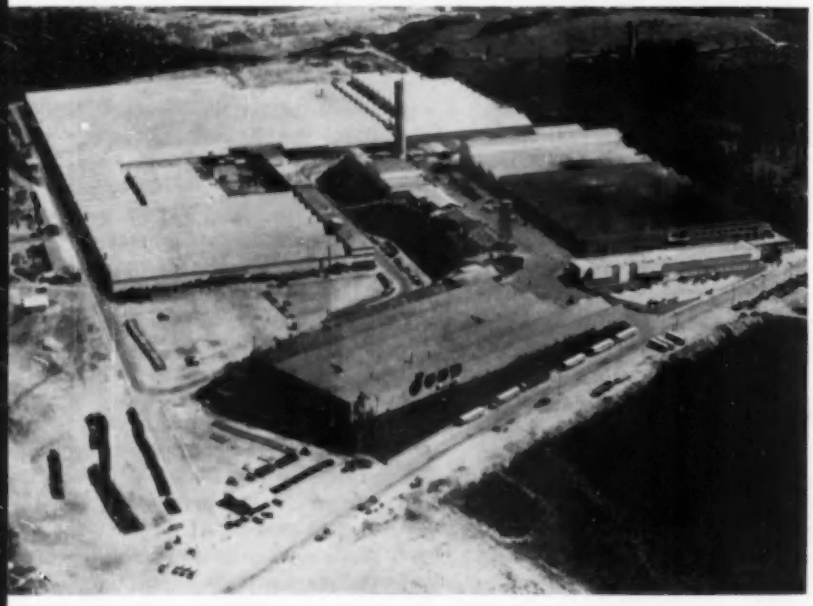
In Brazil, a new company—Sifco do Brasil—was established a year ago by Steel Improvement & Forge Company and the American Brake Shoe Company in partnership with a Brazilian company at Sao Paulo, with the American companies having approximately 72½ per cent of the equity. The new company has 150,000 sq ft of manufacturing space with a potential of about 18,000 tons annually. The basic forging equipment consists of three upsetters—one six, one five and one three inch machines—and 14 hammers ranging in size from a 15,000-lb steam hammer to small board hammers. In March 1960 the company produced the first twisted crankshaft ever forged and machined in South Amerca. Machining was done at the San Bernardo plant of Willys-Overland do Brasil for the "Jeep" six-cylinder engine.

How Willys Purchasing Is Organized

As illustrated in the accompanying chart, the Willys purchasing department is organized on functional lines under the overall direction of the vice president of procurement. Each of the eight major buying sections—Trim, Stampings; Major Assemblies and Electrical; Standard Parts; Castings and Forgings; Parts and Accessories; Non-Production, and Raw Materials—is under the direction of a Purchasing Agent with a staff of one or more buyers and supporting personnel.

Also directly responsible to the procurement vice president are two staff sections; the office of the administrative assistant — in charge





Above—New forge plant of Sifco de Brasil, Brazilian company organized a year ago by The Steel Improvement and Forge Company, Cleveland, Ohio, in association with Companhia Mechanica e Importadora and The American Brake Shoe Company. Located at Jundiai, a small town near Sao Paulo, the plant produced in March, 1960, the first twisted crankshaft ever forged and machined in South America.

Left—The foundry operated by Willys-Overland do Brasil is located at Taubate, near the main plant at Sao Paulo.

Below—"Jeep" vehicles and the Aero Willys passenger car are being produced in the new factory of Willys-Overland do Brasil in Sao Paulo, Brazil. The plant has 1,300,000 square feet of floor space and is turning out about 34,000 vehicles annually.

of departmental follow-through, personnel, records and stenographic services—and the value analysis section, which conducts continuous research and analysis to secure maximum value at a minimum cost, reviews the day-to-day transactions of the buying sections, and provides a full-time consultative service on matters affecting cost patterns.

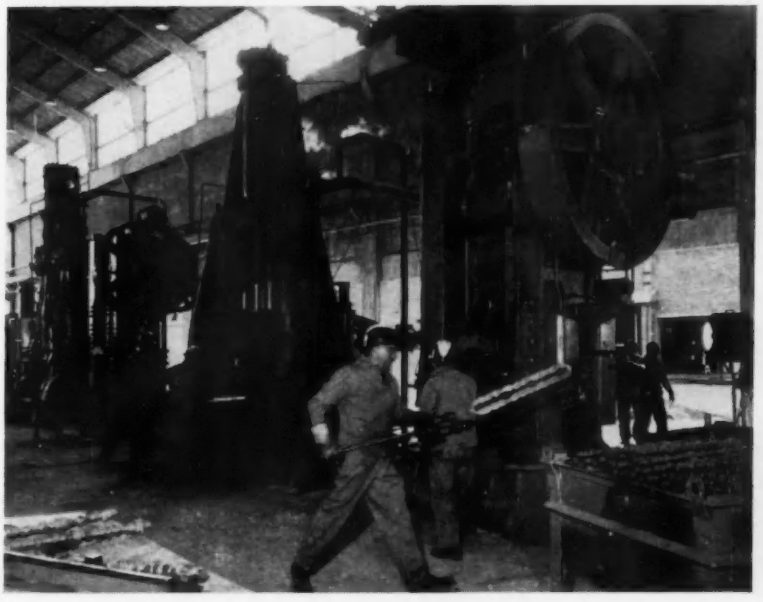
Vendors Are Rated on Merits

Each vendor from whom the company currently buys or contemplates buying is rated as to financial responsibility and general preference. Numerical code ratings are established on the basis of data received from financial reporting services and information accumulated on vendors' costs, manufacturing methods, facilities, product characteristics and related information.

Right—Industrias Kaiser Argentina, S.A., an affiliate of Willys Motors, Inc., produced 23,750 vehicles at its plant at Cordoba, Argentina, in 1959 and is currently turning out more than 2500 vehicles per month with 1960 output expected to approximate 50,000 units. Six models of "Jeep" vehicles are produced and three passenger cars — the Kaiser Carabela, the Renault Dauphine, under license to Regie Nationale des Usines Renault, and the Bergantin, a medium-sized vehicle with a body designed by Alfa Romeo.

Right—A view of the body-building line in the Cordoba, Argentina, plant of Industrias Kaiser Argentina, S.A.

Below—Camshafts for "Jeep" vehicles and passenger cars are among the parts turned out in the new forging facility at the I.K.A. Cordoba plant.



As each purchase folder is established, the vendor's rating is recorded on the requisition coincident with routine reviewing procedures. Buyers who contemplate placing orders with new vendors first obtain acceptable rating codes for the sources under consideration before finalizing their negotiations.

New Vendors Are Encouraged

As a matter of policy, Willys buyers are encouraged to develop new sources in order to stimulate competition. Despite use of the vendor rating system as a measure of financial strength, small businesses are given full consideration with relatively large enterprises in the selection of material sources. In excess of 60 per cent of Willys suppliers fit into the small business category.

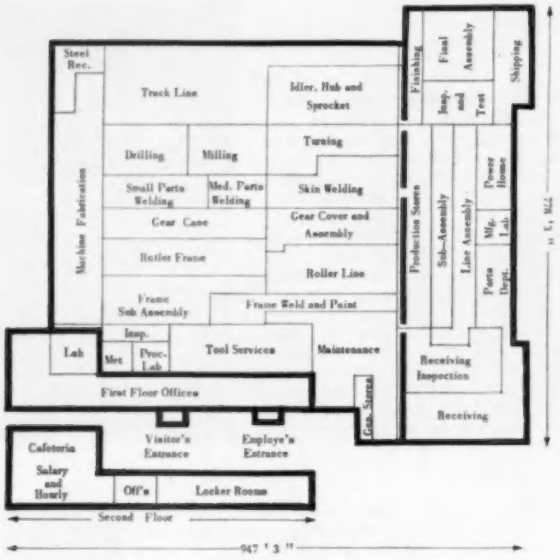
Engineers' Suggestions Sought

In the final analysis, of course, the purchasing department buys what it is asked to buy; however, it also is responsible for the quality of what is procured. While material specifications are the initial responsibility of other departments, the purchasing agent consults with

(*Turn to page* 112, *please*)

Making Large Tractors at Euclid's New Plant

By Joseph Geschelin
DETROIT EDITOR



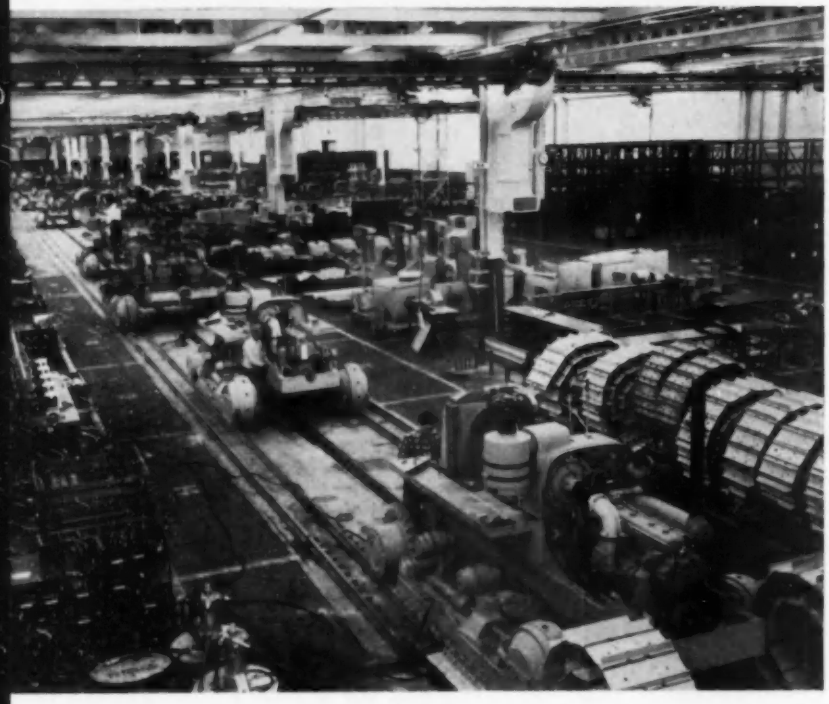
Schematic layout of Euclid plant arrangement by departments.

LATEST development in the vast expansion program that is taking place at the Euclid Division of General Motors Corp. is found in the newly completed plant in Hudson, Ohio, about 30 miles from Cleveland. Located on the outskirts of this small community, the plant represents the latest expression of functional architectural design created about a simple floor plan, designed for the most economic flow of materials and operations. The sketchy presentation of the floor plan, reproduced here, shows roughly the layout of major departments and indicates the flow of work and parts leading from the left to feed directly to the sub-assembly and final assembly line at the extreme right.

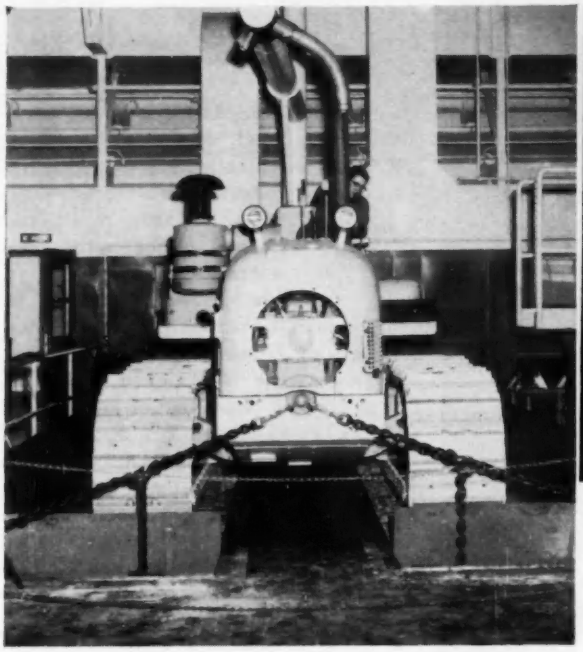
The entire structure, including office space and service facilities, includes some 662,125 sq ft of floor space. Of this, 572,671 sq ft is devoted to manufacturing. The property embraces 400 acres of land, thus providing ample space for a large warehouse which is under construction at the present writing.

The Hudson plant is devoted exclusively—at this writing—to the manufacture of two types of large tractors—the Twin-Power TC-12, and the Model C-6. While these machines are characterized as tractors, they are of uncommon size and their components are enormous when compared with the usual product in the automotive industries. Some impression of size may be gained from the fact that the TC-12 machine, without attachments weighs 69,000 lb, while the smaller C-6 tractor weighs 42,000 lb.

What makes this operation quite remarkable, considering the size of the assembly and corresponding size of individual components, is that the manufacturing process is conducted on fully automatic transfer machines and special machines. Moreover, the entire operation is fully mechanized through the use of conveyor lines of various kinds,



Perspective view of final assembly line, showing both types of large tractors in various stages of completion. Note that the line has two sets of guide rails: inner pair for the Model C-6, the outer pair for the TC-12.



Above—Portion of the large merry-go-round for fabricating the main frame. This line has 10 fixtures and is serviced by Hobart AC welding units.

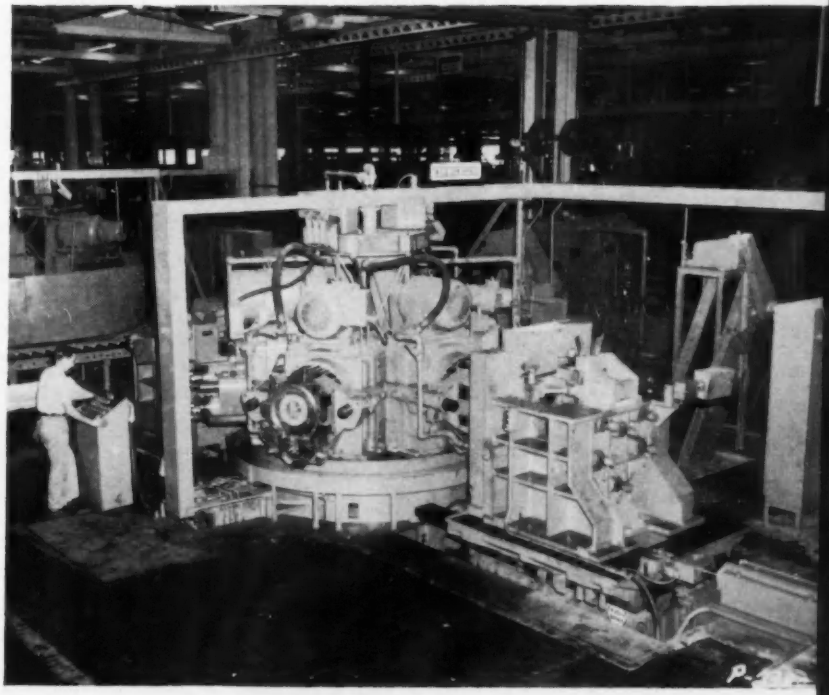
Left—Here is a C-6 tractor lashed in place on the skid dynamometer.

including automatic feeding and loading and unloading. As a matter of fact, the track department boasts a complete system of power-and-free conveyors for transporting the work through the gamut of operations.

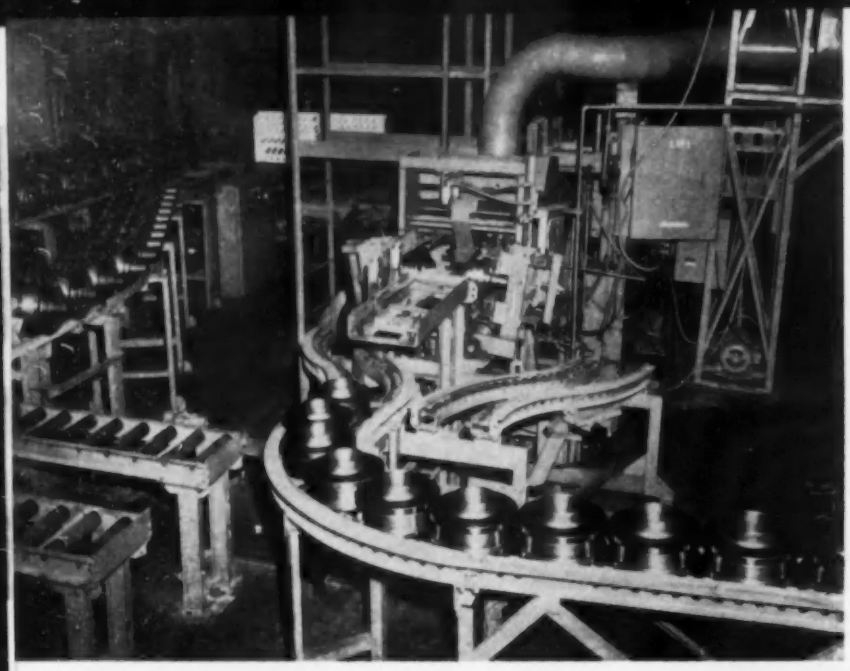
Due to the size and weight and enormous load-carrying capacity embodied in the components, most of the structure is fabricated from heavy steel plate. This includes elements such as the drive case, main frame, and roller frame. The operation begins with the flame cutting of the intricate pattern required for sections of the roller frame and main frame. This is done in a battery of three, Air Reduction tracer-controlled flame cutting machines, generally using six torches at a time. It is indeed a major operation when you consider that some of the sections are about three inches thick.

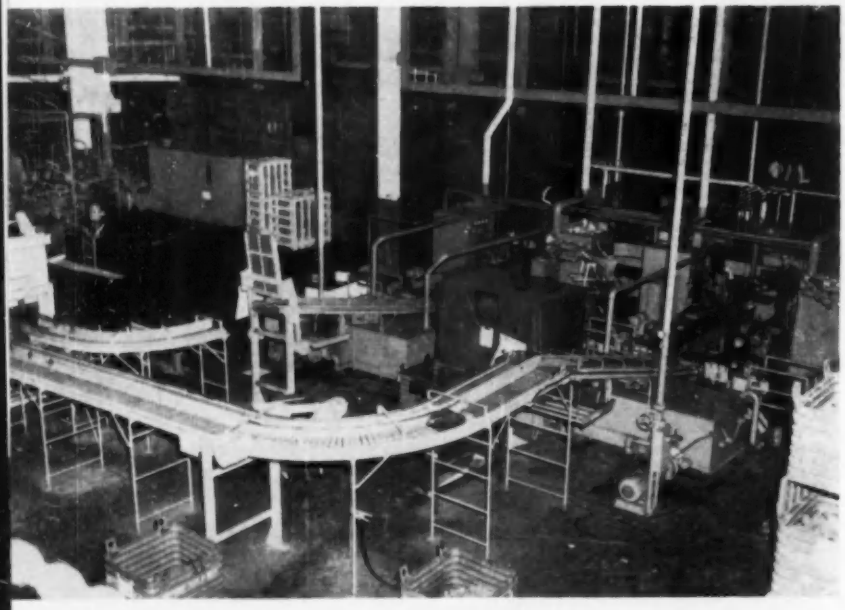
To facilitate the welding of these separate sections into the final assemblies, Euclid has developed a group of four merry-go-round welding conveyors. They all employ the same principle of operation and we have selected the largest of these —the main frame assembly—to illustrate the general scheme. All of the welding on the merry-go-round lines is done with individual Hobart welding machines of AC type. The main frame conveyor, illustrated here, incorporates 10 fixtures.

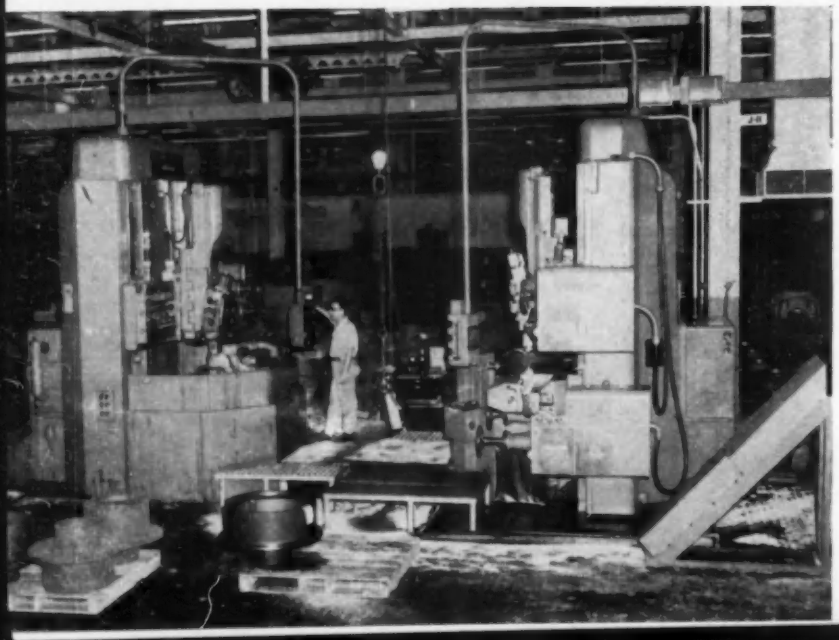
Since the main frame has many elements that require precise location as well as alignment, the components of the assembly are prepositioned and aligned in an enormous fixture, much like an inspec-



One of the W. F. & John Barnes special automatic machines for operations on the huge gear case and its covers. There are three machines in this area, one of them being of turret type with two, five-station rotary tables, one on each side.







tion fixture. The parts are carefully aligned, securely clamped in place, and finally tack-welded while in the fixture. This tack-welded assembly then is transported to the merry-go-round line for the final welding operations.

So much process is involved in the various stages of welding, machining, heat treating, etc., that this article is designed mainly to provide a sampling of operations.

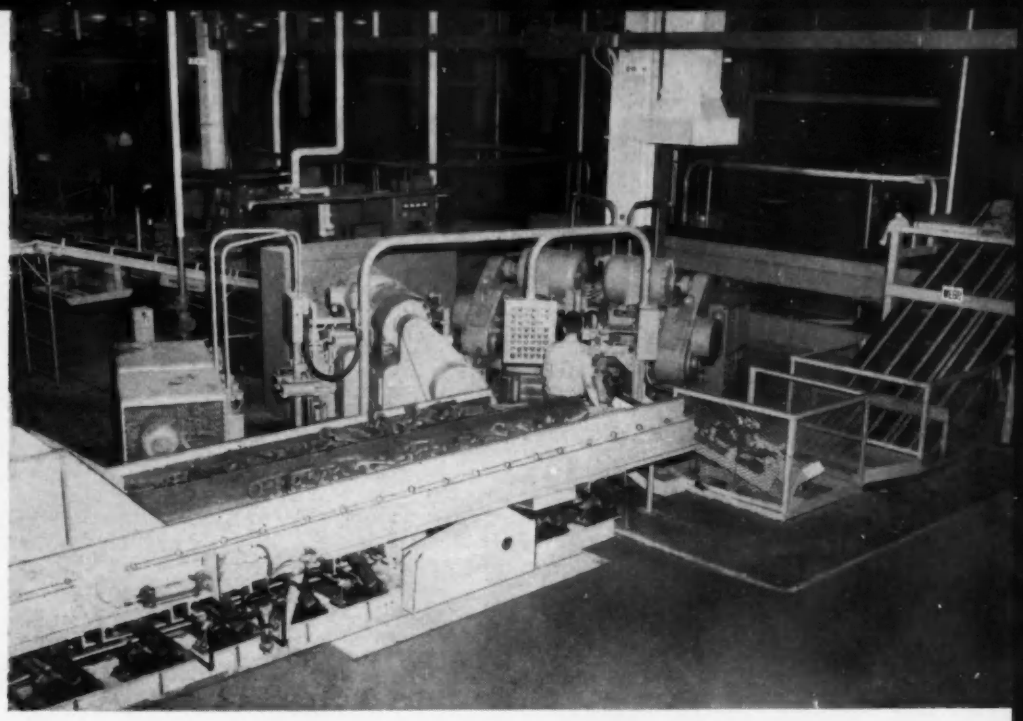
For example, W. F. & John Barnes has supplied a group of six special automatic machines of outsize for a number of parts, including a battery of three, turret type machines for the big case and its covers. We shall describe briefly the largest of these, a special turret-type machine with two, 5-station rotary tables, one at each side, together with a shuttle-type work-holding fixture. The machine handles two cases—right- and left-hand—which have been initially machined in the first unit of this group. In addition, both ends of the case have been milled in a large three-station Ingersoll mill before coming to this station.

The central fixture, holding a case on each side, is mounted on a fixture saddle which travels on 40-in. ways. It is arranged with two feeds in two directions to present the work to each of the five-station rotary tables. It will be obvious that the heads at each end remain stationary, the work being presented to each head by means of

Top—
Track rollers start as individual forgings, machined in rights and lefts for welding into a double roller. This is the welding machine in which the two halves are joined by a Lincolnweld attachment. Note particularly the mechanization for automatically feeding work to the welder and unloading on the conveyor for transport to the next operation.

Middle—
Overhead perspective view showing the fully automatic conveyor complex for feeding track links to the Tocco induction heating units in the background, then transporting the hardened forgings to the tempering furnaces at the left, out of this view.

Bottom—
Battery of 46-in. Bullard automatic VTL's for machining the large-diameter idler wheels.



Track links are milled in the special Ingersoll milling machine seen here. Links are delivered to this station automatically; transported after finishing by means of the Webb elevator and conveyor system at the right.

the shuttle fixture. Altogether there are 328 active spindles on the left hand side; 322 active spindles on the right hand side.

For another example of complex fabrication, consider the roller line. Rollers start as individual forgings, machined at the welded joints in rights and lefts for assembly into a double roller. The entire process is tied together by a conveyor system. The rollers travel in pairs through a preheating furnace, then into a welding machine fitted with a Lincolnweld head where the two halves are welded together. The work then continues on the conveyor, enters a large Tocco induction heating machine where the periphery of the OD on both halves is hardened to specifications.

The large diameter idlers are machined in 46-in. Bullard Man-U-Trol vertical turret lathes.

One of the interesting features is the provision for final testing of assembled tractors. As illustrated, Euclid has developed a special skid test machine into which the tractor is lashed securely. This arrangement makes it possible to operate the machine in every desired maneuver — both tracks running together at varying speeds; tracks running in opposite directions; forward and reverse operation at varying speeds; etc. Besides providing an actual operating test this machine also takes care of running in the track mechanism as a plus feature. In general, this test procedure takes about two hours.

To round out the facilities in this plant, Euclid has extensive laboratory facilities, including metallurgical, chemical, and mechanical testing. Among the interesting items of equipment is a Curtiss-Wright Immerscope which is used for the ultrasonic exploration of heavy steel parts to assure freedom from fractures or discontinuities that might cause failure.

It is noteworthy that the final assembly line, pictured here, runs some 300 ft in length and has 15 assembly stations. ■

• • •

Soil-Vehicle Systems Conference Slated

The First International Conference on the Mechanics of Soil-Vehicle Systems will be held in June, 1961, in Turin, Italy.

Delegates will discuss present concepts of the mechanics of land locomotion and their engineering aspects. A number of papers will be read and discussed during the four or five-day parley. The United States, West Germany, France, England, Japan, Canada, Holland and Israel have agreed to participate.

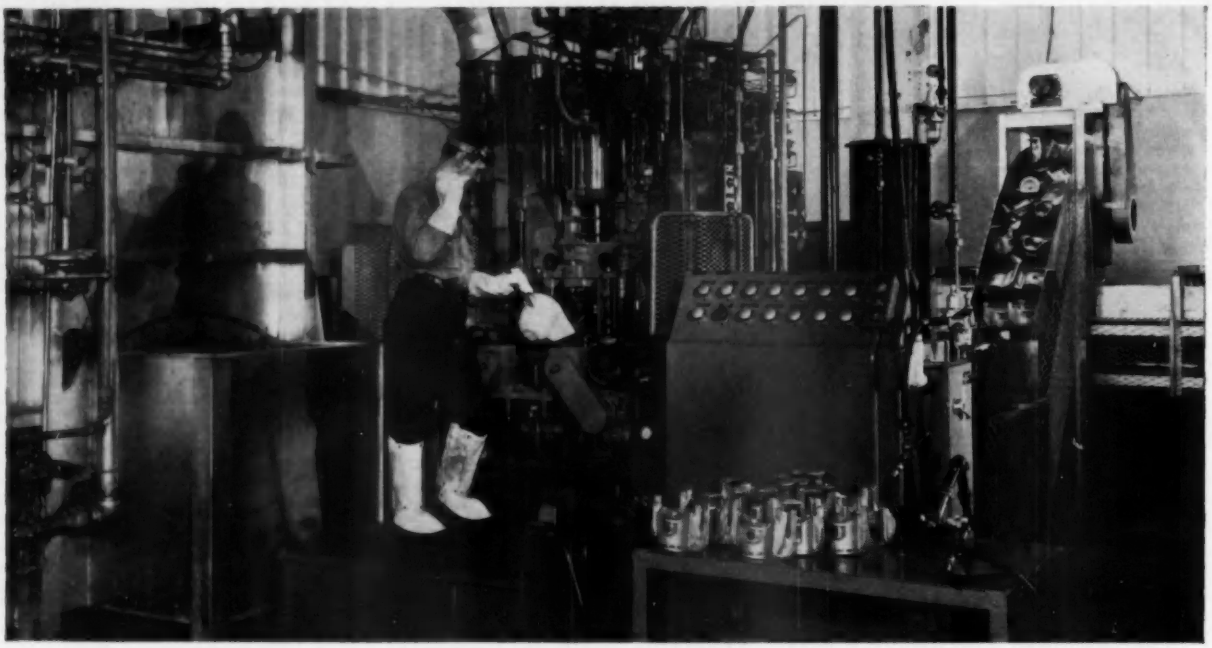
Topics to be discussed include vehicle performance prediction; design evaluation of tracks, wheels and tires; statistical evaluation of locomotion in random terrain conditions; new vehicular concepts; landing gears for aircraft which could operate without landing strips; and some aspects of lunar surface locomotion.

Those interested in attending the conference or submitting a paper, or in obtaining more information, are urged to write to Headquarters, U. S. Army Ordnance Tank-Automotive Command, Land Locomotion Laboratory, 1501 Beard St., Detroit.

Israeli Concern To Manufacture Jeeps

Willys Overseas has signed an agreement with Kaiser-Ilin Industries, Ltd., of Israel for the complete manufacture of Jeep vehicles. For the last 10 years, the Israel firm has been assembling Jeeps with components shipped from the Willys home plant in Toledo, O.

Under terms of the new agreement, Kaiser-Ilin will manufacture the Jeep Universal, sedan delivery, one-ton pickup truck and utility wagon.



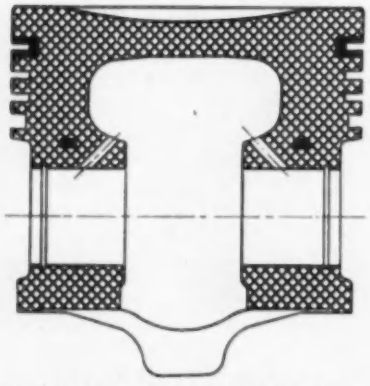
Close-up of one of the GM die casting machines for producing aluminum pistons. Besides the features of multiple-station automaticity inherent in the design of this equipment, it is noteworthy that pistons are cast with the open end in up position. This is indicated by the gating of the pistons seen on the table in the foreground.

Production of V-6 and V-12 Engines at GMC Truck & Coach Division

By Joseph Geschelin
DETROIT EDITOR

PART III

PISTONS for V-6 and V-12 GMC Truck & Coach Division engines are produced in three basic sizes in a compact department of the engine plant. What makes this operation unique is that the division has decided to make the piston castings as well as to machine them. As a matter of fact, a self-contained melting and casting department has been installed immediately adjacent to the machine line.

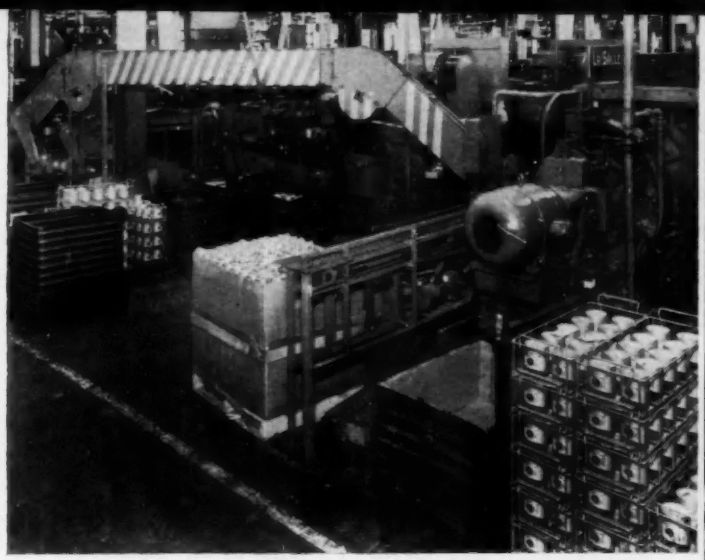


Cross-section of typical GMC piston, showing massive head, details of steel strut and top ring insert.

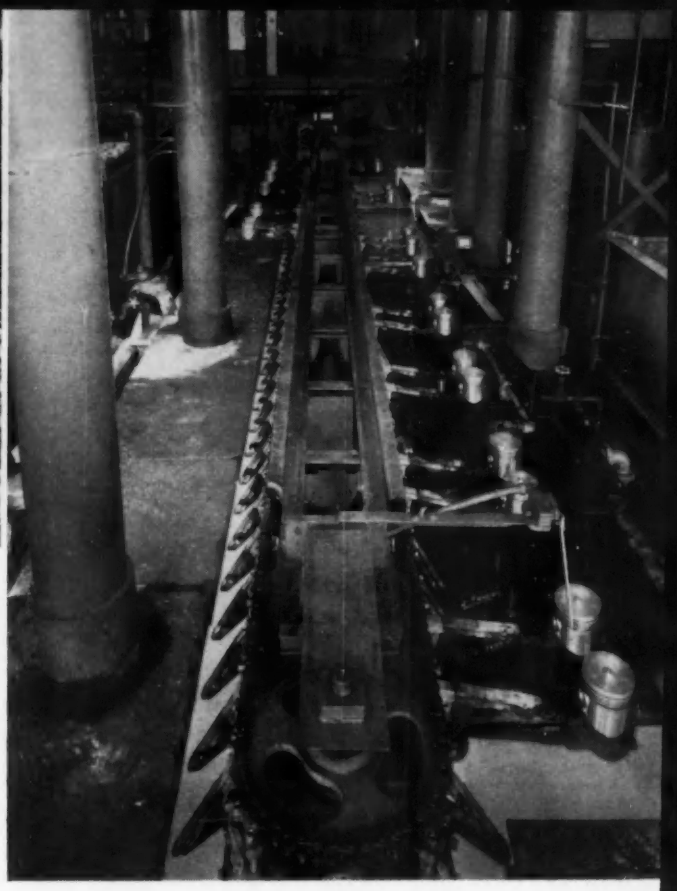
Pistons are made of aluminum alloy in a group of special four-station, fully automatic permanent mold casting machines built by the Process Development Staff of General Motors Corp. GMC believes it is a "first" that these pistons are cast with the dome down, i.e., the open end is at the top.

Besides being made in three

This is the third installment of a study dealing with the manufacture of the new line of V-6 and V-12 engines at GMC Truck & Coach Division. The first article (see AI, May 15, 1960) covered highlights of cylinder block machining; the second installment (AI June 1) was concerned with the machining of cylinder heads and crankshafts.



The piston machining line at the initial operations. First machining operation is performed in the special 6-station, trunnion type LaSalle automatic on the right. Machined pistons are automatically unloaded, then picked up by the elevator conveyor in the foreground for transfer to the steel belt distribution conveyor at the left. The next operation is handled in one of two National Acme-Gridley 8-station automatics which may be seen at the left.



Following the initial machining steps pistons are transferred to this F. B. Stevens automatic tin-plating machine. Pistons are picked up automatically by the arms on the conveyor, transported along the plating machine, and discharged at the opposite end for finishing operations.

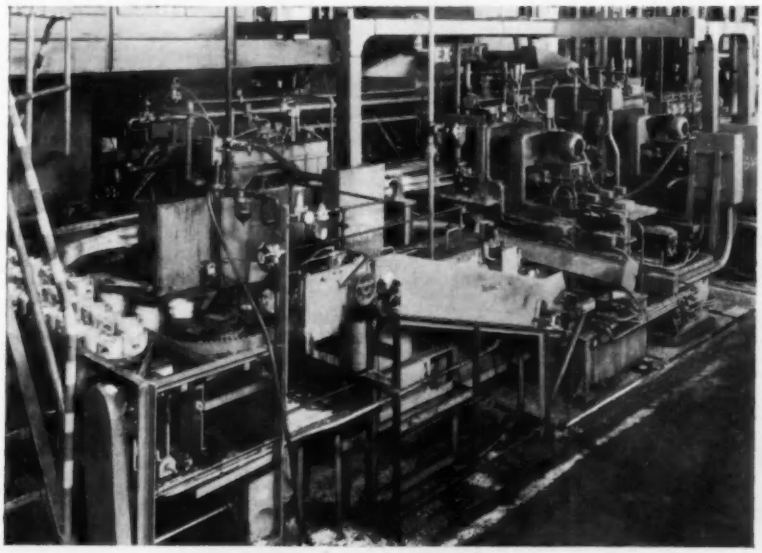
sizes, the pistons are of two distinct types: all pistons have cast-in steel struts to control expansion; in addition, pistons for heavy duty service have a cast-in insert at the top face of the first ring groove.

The compact manufacturing department is laid out approximately in U-shape with all operations linked automatically by means of a distinctive material handling system developed by Cooney. One of its major elements is a 24-in. wide stainless steel conveyor belt that traverses one side of the equipment preliminary to tinplating.

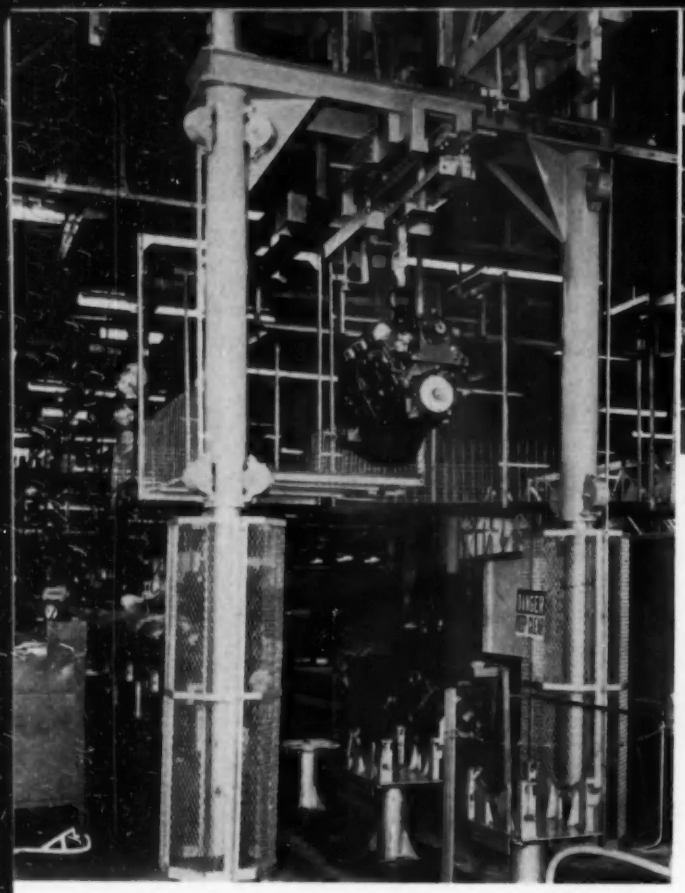
Pistons are initially machined in a LaSalle machine set to one side of the line, transported by a special elevator over the aisle to the belt. Here pistons enter one of four channels on the belt conveyor, feeding the work first to a group of two National Acme-Gridley automatics. In general, pistons are delivered automatically to a machine from a channel on the top, returned to the lower section of the belt, then transported back to the proper channel on the top of the belt for movement to the next operation.

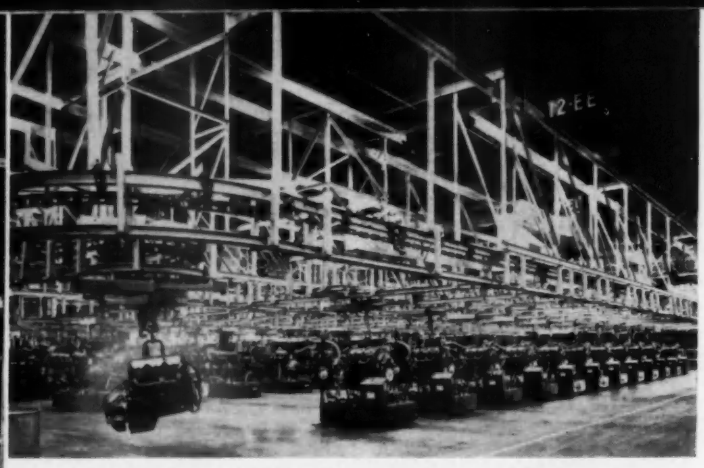
Each of the machines is fitted with its own automatic loading and unloading mechanism, permitting the entire setup to function in fully automatic fashion. There are operators to be sure. But their chief function is to police the operation and make a floor inspection of a sampling of parts to be sure the process is under control.

It is obvious that with this arrangement pistons have to be scheduled in economic lots to permit changes in tooling for each of the three basic sizes. (*Continued*)



This is a perspective of the 36-station Ex-Cell-O transfer machine for cutting the piston pin retainer grooves, boring the piston pin holes, and removing center boss from the dome.



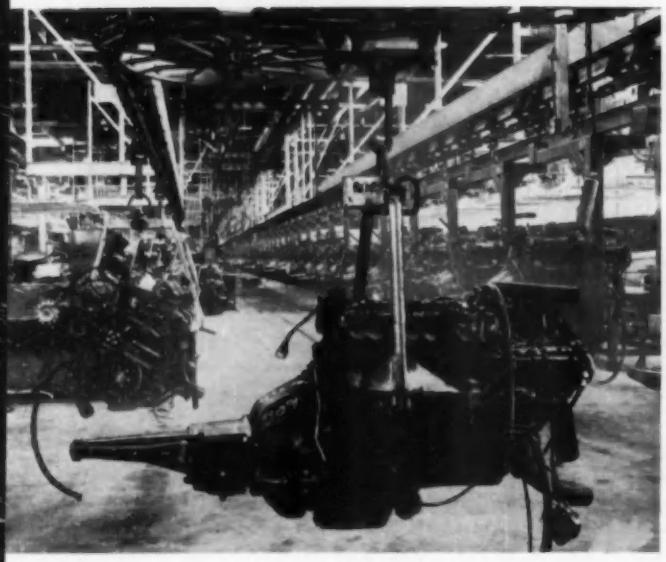


General view of the hot test area with the engines (such as the one at the left) traveling on a predetermined course on the power-and-free system. Test stands may be seen in orderly rows in the foreground and background. The power-and-free system, consisting of six conveyor lines, has some 3300 ft of lines, plus an additional 263 ft through the test area.

End of the engine assembly line. Here the finished engine meets the power-and-free conveyor system. The engine is engaged by an arm on the elevator in the foreground and is ready for the trip through the "hot" test.

The sequence of operations in this department is as follows:

1. Center dome end; drill, chamfer, and ream two locating holes for manufacturing purposes; face weight bosses for location. This is done in a 6-station, trunnion type LaSalle machine.
2. Rough- and semi-finish-turn ring lands; rough- and finish ring grooves; form dome. This is done in a group of two National Acme-Gridley 8-station automatics.
3. Rough-bore piston pin holes; drill two oil holes; saw two slots in lower ring groove. An 11-station Lamb transfer machine handles these operations.
4. Grind the elliptical contour on the skirt. For this purpose there is a battery of five Cincinnati special piston relief grinding machines.



View along the engine dress-up line, showing engines in process. One of the engines ready for the truck assembly line is directly in the foreground.

This group of operations is handled on the line served by the steel belt conveyor. As pistons emerge from the Cincinnati grinders they are routed automatically to the F. B. Stevens automatic tin-plating machine. Here too the fixtures are loaded and unloaded automatically. Following tin-plating pistons are transported on a conveyor to the parallel line of equipment, entering first a 36-station Ex-Cello-O transfer machine. Each of the units of this machine is a version of the familiar precision-boring equipment and is of three-spindle type.

The Ex-Cell-O machine handles the following operations: cut piston pin retainer grooves; semi-finish and finish-bore the piston pin hole; remove center boss from the dome. This machine, which incorporates automatic orientation and turnover of pistons, includes an ingenious transfer bar mechanism of hinged type.

Pistons continue to flow to a special transfer machine supplied by Motch & Merryweather for automatically milling the weight bosses to a standard weight. Weight is held uniformly to plus or minus

(*Turn to page* 110, *please*)

Fatigue Research
Scanned at ASTM 63rd Annual Meeting

A PROPOSAL to supplement Government technical assistance to underdeveloped countries, in the form of ASTM standards, was presented by F. L. LaQue, International Nickel Co., in his address as retiring ASTM president at the 63rd Annual Meeting of ASTM in Atlantic City. He pointed out that the society has over 1400 members in 50 foreign countries and that sales of ASTM publications abroad amounted to over $200,000 in 1959.

LaQue emphasized that underdeveloped countries could profit by the availability of standards covering good practice in practically every field of engineering. Another value accruing from this would be that foreign purchasers could use the standards in buying from suppliers in the USA. This would assure the maintenance of standard specifications and quality control and should be of benefit to our domestic producers.

Over 3000 members, committee members and guests attended the 37 technical sessions held in the last week of June, 1960. In addition, upwards of 900 committee meetings were in progress. Due to this enormous volume of activity, much of which is not of direct interest to readers of AI, this news report has been restricted to a few selected papers as well as a summary of a symposium on cutting fluids held by Technical Committee K of D-2.

Of particular interest to our readers were the sessions on continuing fatigue research, aimed especially at aircraft and missile structures, covering also a relatively new aspect of the problem—acoustical fatigue.

A review of experimental techniques for acoustical fatigue research was presented by D. M. Forney, Jr., Wright Patterson Air Force Base. In studying the fatigue properties of acoustically excited airframe structures, the most general practice is the use of a high intensity siren, largely because of the considerable expense involved in operating the more desirable random noise sources such as the turbojet engine.

In addition to variations in the type of sound excitation, i.e., pure tone vs random noise, the angle at which sound waves are made to strike test items has been varied. While turbojet test stands are employed for structural testing purposes, they usually only supplement prior tests using less expensive means of excitation. Both enclosed and open stands are in use, the open stands being preferred since they involve fewer problems. Other facilities include the cold air jet, and the air stream modulator which shows promise of providing both pure tone sounds and random noise with sufficient energy to test some structures.

A. M. Freudenthal, Columbia University, discussed the problems of fatigue of structural metals under random loading as applied to all manner of automotive equipment, including aircraft. After discussing various aspects of the problem to develop a rational approach to fatigue-damage accumulation under randomly applied variable stress amplitudes, the author concluded that any rational approach must combine both physical data and statistical analysis.

Touching on acoustical fatigue, Freudenthal concludes that a distinction must be drawn between conditions of "narrow-band" acoustic excitation, and conditions more representative of "low-level" fatigue with mixed stress amplitudes and long lives.

Another attack on acoustic fa-

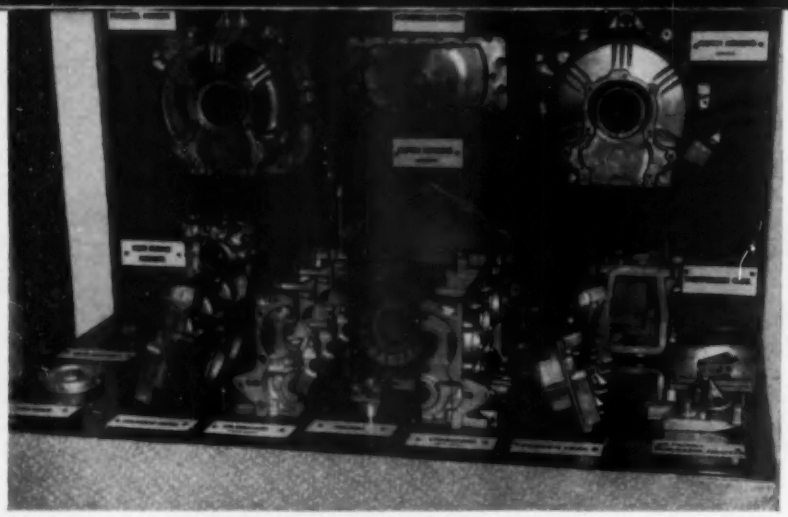
(*Turn to page* 120, *please*)

By Joseph Geschelin
DETROIT EDITOR

ASTM President

A. Allan Bates has been Vice-President for Research and Development of the Portland Cement Association, Chicago, since 1946. He joined the P.C.A. organization after 10 years as manager of chemical, ceramic, and metallurgical research at Westinghouse Electric Corporation.

A native of Elyria, Ohio, Dr. Bates was graduated from Ohio Wesleyan University with an A.B. degree in 1923. Case Institute of Technology conferred on him the degree of B.S. in Metallurgical Engineering in 1925 and M.S. in Engineering in 1929. He received the degree of Doctor of Science in 1931 at the University of Nancy, France (with honors). Stevens Institute of Technology awarded him the honorary degree of Doctor of Engineering in 1944 and Rose Polytechnic Institute the honorary degree of Doctor of Science in 1947. He served as Professor of Metallurgical Engineering for two periods at Case, 1927 to 1929, and 1932 to 1937.



Aluminum parts produced currently at the Chevrolet Massena foundry.

New Chevrolet Aluminum Foundry

Fifteen Different Parts, Made by Conventional Die Casting, Conventional Permanent Mold Casting, and Low-Pressure Permanent Mold Casting Techniques, Are Produced in Massena, N. Y., Plant

Left—
One of the low pressure permanent mold machines at Massena, this one producing Corvair cylinder heads.

Below—
Corvair cylinder heads are intricately cored. Here is the intake manifold core, made of urea-formaldehyde resin, as it comes out of the core molding machine.

Low pressure, permanent mold casting of aluminum components for the Corvair engine, a "first" for Chevrolet, is one of the distinctive techniques developed for the new Chevrolet Motor Division aluminum foundry at Massena, N. Y. Details of this foundry and the Reynolds Metals Co. reduction plant that serves it with molten aluminum were revealed at a special press preview held last month. The press tour also afforded a quick look at the setup for producing Corvair engines at the Tonawanda (N. Y.) Chevrolet engine plant.

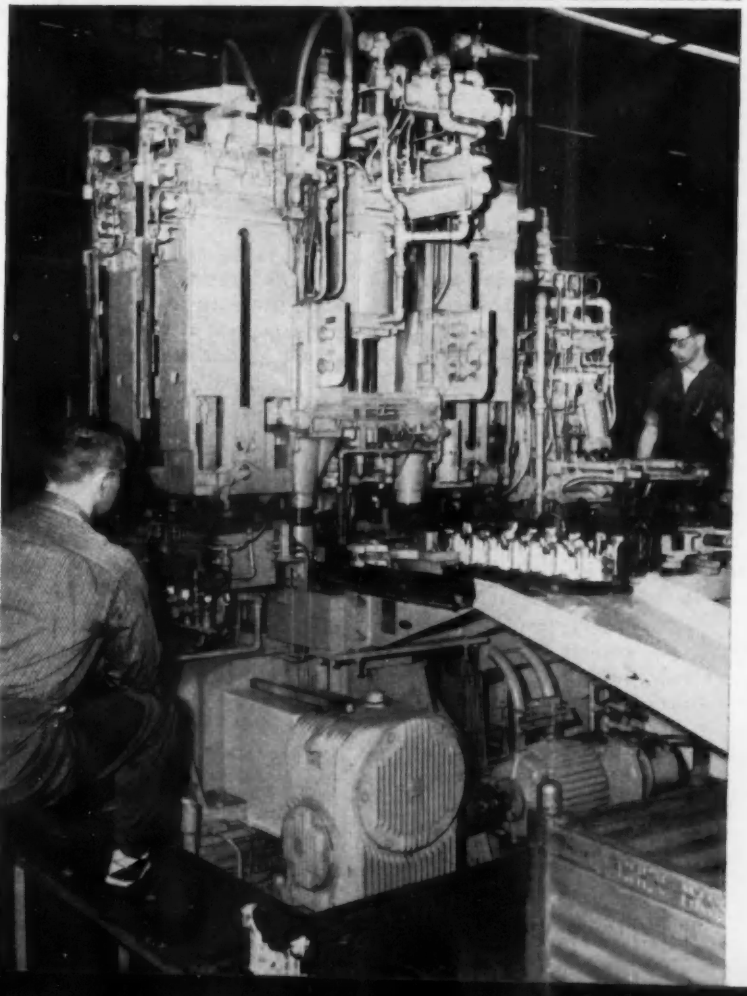
Low pressure permanent mold casting has been used in European foundries for many years. Its use in the USA, on the other hand, has been confined to a few special applications in the past; and its adoption by Chevrolet represents a first for the automotive industries in this country. Meanwhile, it is of interest that the larger and more intricate castings—left and right hand crankcase sections, cylinder heads, engine gear housing, and oil filter adapters—all are produced by this technique at Massena.

Chevrolet-Massena, located about 12 miles from the village of Massena, N. Y., has become a part of the industrial complex associated with the St. Lawrence Seaway de-

By Joseph Geschelin

DETROIT EDITOR

—Right
Mechanized trim line at Massena preparing cylinder heads by cleaning and deburring. All deburring is done manually.



—Below
One of the complex automatic permanent molding machines developed by GM's Process Development Section for producing pistons.

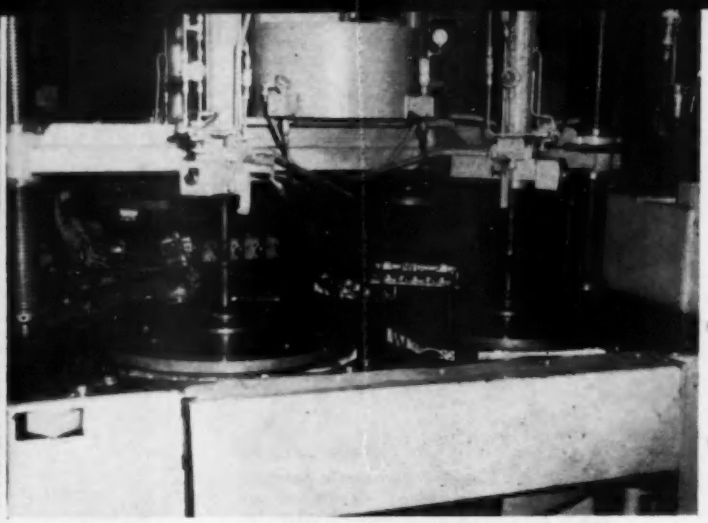
velopment. It has a manufacturing area of some 195,000 sq ft, and employs about 715 people. At the present writing it produces 15 different castings, made by conventional die casting, conventional permanent mold casting, and low pressure permanent mold casting techniques.

During the period May, 1959 (start of production) and June, 1960 Massena shipped approximately 3,662,000 castings, accounting for some 22,851,000 lb of aluminum. At the present writing it consumes about 3.5-million khw of electricity per month.

Massena is the third large aluminum foundry of record, built in recent years in conjunction with a major Reynolds Metals reduction plant which contracts to provide an unfailing supply of high purity aluminum in the molten state. This Reynolds plant is located only three-quarters of a mile from the Chevrolet foundry, connecting the two plants with a private "hot" road. Over this road Reynolds transports molten aluminum on Chevrolet tractor-trailer combinations around the clock, 365 days a year, each trip delivering two huge ladles containing a total of about 17,000 lb of metal.

The Reynolds St. Lawrence aluminum reduction plant is the eighth aluminum-making facility in the company, with a rated capacity of some 200-million lb per year. It has three enormous potlines of which only two are activated. The present plan is that about one-third of the annual output of this reduction plant will be delivered to Chevrolet. In addition to supplying molten

Close-up of low pressure permanent molding machine for producing Corvair crankcase halves. The metal holding furnace is seen directly below the molding station.



Crane Lapmaster serves to lap the mating faces of crankcase halves to a high degree of flatness coupled with fine surface finish. Flatness is held to 0.002 in. over the extreme corners of the castings.

metal, the plant also produces aluminum in the form of pig, ingot, and billets for other users, including several Reynolds plants.

The advantages of teaming up an aluminum foundry with an adjacent reduction plant are enormous. The molten metal is tapped directly from the pots and immediately delivered to the foundry. As it is poured, the metal temperature ranges from 1700 to 1800 F, naturally losing heat during the transfer. This is advantageous since Chevrolet pours metal in the casting machines at temperatures ranging from 1200 to 1400 F.

Assurance of an unfailing source of molten metal at a desired temperature means that the foundry no longer requires the floor space and equipment associated with the melting of aluminum from pigs. At Massena the operation requires only a battery of holding furnaces in which the metal is alloyed to specific requirements and from which the resulting alloy is delivered directly to the casting machines.

In addition to the parts mentioned earlier, Massena produces by die-casting — flywheel housings, crankcase, covers, idler brackets, oil cooler adapters, stators, and clutch housings. Permanent mold operations are confined to the making of pistons and camshaft gears.

Now as to the salient features of the low pressure method. In the first place the process is a cross between die casting and permanent mold casting. It is akin to permanent mold casting from the standpoint of mold design and mold cost but it employs low pressure to force the metal into the mold cavity. The initial battery of machines installed at Massena was designed by the Process Development Section of General Motors and represents some changes and modifications of European practice more in keeping with mass production requirements.

Incidentally, the best evidence that the low pressure method is indeed succesful may be gained from the fact that Massena has installed another battery of machines to augment 1961 cylinder head production. The design of these machines, which was handled by the Massena staff, embodies additional refinements stemming from production experience.

The low pressure method employs air pressure up to 10 psi to force the molten metal upward into the mold cavity in a relatively smooth and turbulence-free manner. The mold cavity, mounted above the holding furnace, receives metal through a tube, or "stalk," immersed in the molten metal. The slow flow of metal creates a natural temperature gradient in the mold cavity and promotes directional solidification back to the source of molten metal until the casting has solidified.

Chevrolet lists the following advantages for the low pressure method:

1. High density structure, relatively free from porosity and shrinkage.
2. High yield, due to elimination of gates and risers. This is particularly important in large and relatively heavy castings.
3. High productivity—automatic fill and hydraulic actuation of molds permit one operator to service three machines.
4. Low equipment cost. Initial costs are lower than for die casting and about the same as for permanent mold castings. From the standpoint of cost economy this technique can be applied to low volume castings which might otherwise justify die casting equipment.
5. Clean castings. Due to the sealed furnace and under pouring of metal, castings are relatively free of oxides.

To achieve maximum utilization of equipment and molds, Massena has effected a three-shift operation of low pressure equipment through a program of complete interchangeability of molds and parts. Automatic mold actuation and timing, a feature of this equipment, has reduced the need for operator skills. Operating hazards too have been eliminated by the adoption of air and electric safety controls.

As mentioned earlier, alloying is done in the holding furnaces, then the metal is delivered to the various machines in 1000-lb ladles. Quality control predominates not only in the control of the metal but also in the inspection of molds and dies. As a hot metal truck reaches the plant, a sample of metal is taken from each ladle and dispatched to the laboratory via a pneumatic tube.

Spectrographic analysis is made within 10 minutes and the metal then is approved for pouring into the holding furnace. In the interim, the metal in the big ladles is being fluxed with chlorine to remove gases.

In the holding furnaces, magnesium, titanium-boride, and manganese additions are made to suit the specifications for each type of casting. Each holding furnace and each melting furnace is further sampled and checked on the quantometer at regular intervals.

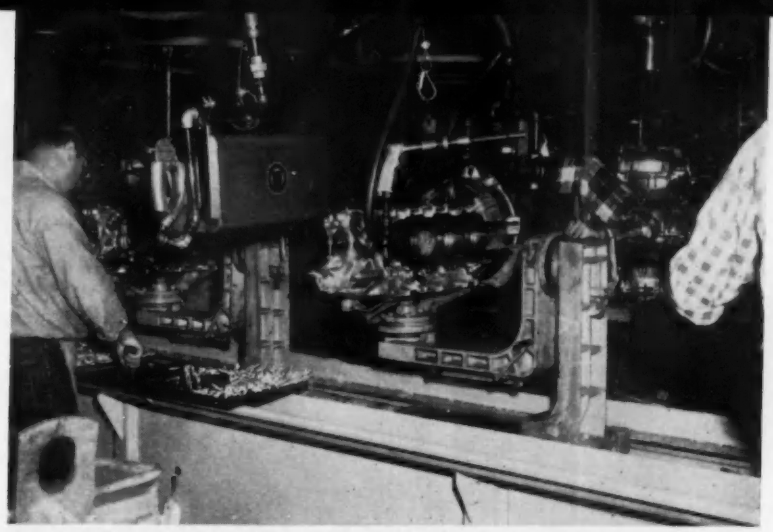
Quality control also is responsible for materials such as those used in making sand cores and resin cores. Incidentally, the cores for the intricately-formed cylinder heads are made of urea-formaldehyde formulation. These are solid cores and they are readily blasted out after the casting is finished.

Cylinder head castings not only are intricately cored but also incorporate a series of cooling fins which must be uniform in spacing and free from flash or imperfections. Fins are formed by means of individual steel blades which are precisely made, inspected and replaced at regular intervals. It is of interest that as the mold is released the blades are drawn out of place one by one to prevent damage to the casting.

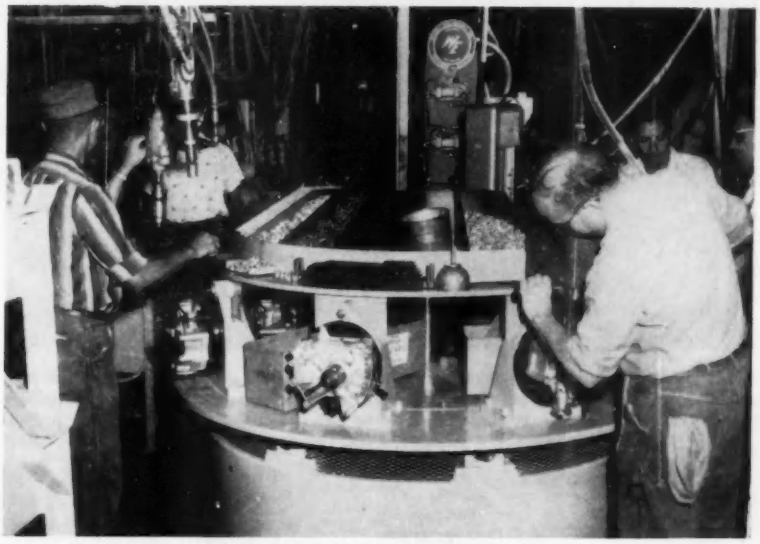
One of the noteworthy operations here is the production of pistons in multiple-station automatic permanent mold machines developed by the Process Development Section. The molds are mounted on a separate indexing table, while a series of automatic heads are mounted on a separate column for picking up strut inserts. These heads then index over the molds to install the inserts in their proper location. Each machine produces two pistons at a time, at the rate of 600 per hour.

One of the major advantages of the low pressure technique is that castings do not require removal of gates and risers and are relatively free from flash. Nevertheless, the cylinder heads are so intricate that a certain amount of finishing is mandatory to achieve the desired

(*Turn to page* 98, *please*)

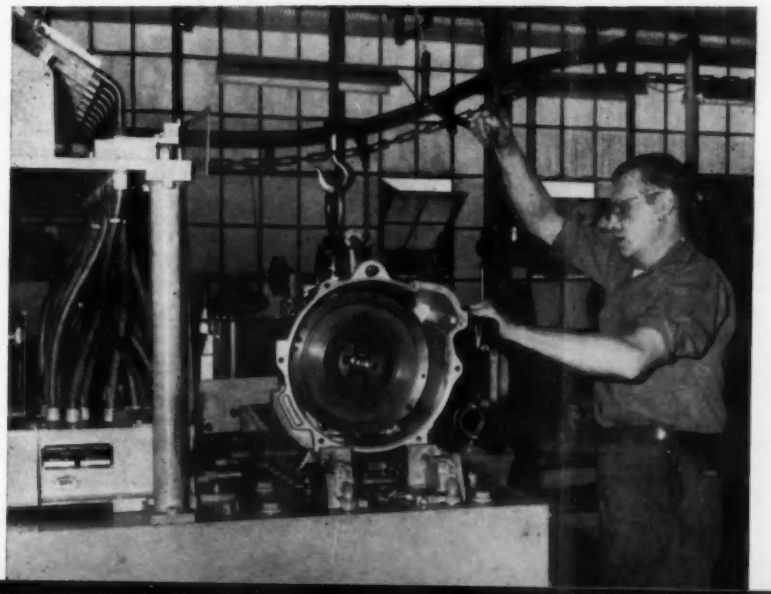


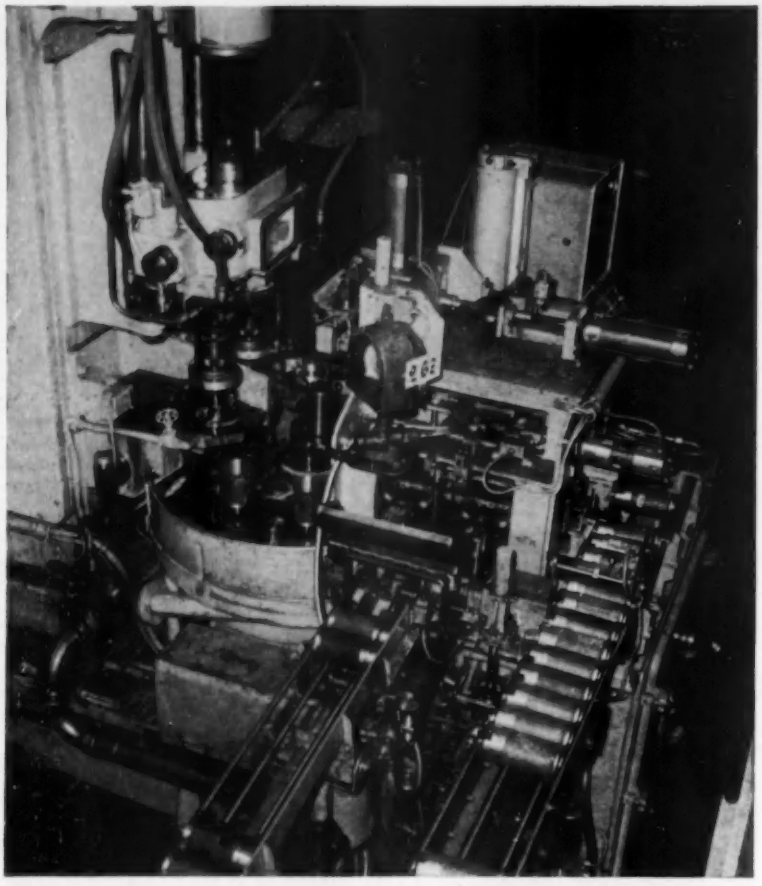
Portion of the final engine assembly line, at the Tonawanda engine plant, showing details of the unique assembly fixture. Having freedom of alignment in all three lanes, this fixture facilitates assembly operations at every stage.



One of several assembly tables of indexing type is shown here. This one facilitates the assembly of an engine gear case. Note the air tools and the conveniently reached bins containing small parts. A similar table is used for the assembly of crankcase halves prior to machining.

Ingenious equipment for making up oilpan fastenings in a single setting was supplied by Gardner-Denver. This operation takes place immediately after engines are removed from the final assembly line.





General view of the Renault-built automatic honing machine, with the incoming gravity track at the right carrying cylinder liners to the "square" indexing transfer-loader. After honing and gaging on the circular work table, pairs of liners are ejected onto the second track

Automatic Honing Machine for Dauphine Cylinder Liners

By David Scott
Special European Correspondent
for AUTOMOTIVE INDUSTRIES

THE Renault factory at Billancourt, near Paris, has recently installed an unusual, fully automatic machine for honing cylinder liners for the Dauphine engine. Designed and built at the plant, it consists of a four-position rotary work table fed by a four-sided indexing transfer-loader. Liners are honed and gaged in pairs, with a cycle time of about 30 seconds.

Incoming liners roll down a gravity track to position (1) on the "square" loader (see accompanying drawing). The first and third components in line come to rest above retracted tilters at the end of the track, while the second is temporarily retained.

These air-operated tilters raise the two liners from horizontal to vertical, presenting them to the loader which grips them with pneumatic fingers. The transfer mechanism then indexes counter-clockwise, after which the tilters drop back to horizontal to receive the next pair of workpieces.

At position (2) liners are initially checked by an air gage and feeds down into the bores. If the undersize limit is exceeded the machine is stopped and a warning signal given, thus preventing accidental damage to the honing heads.

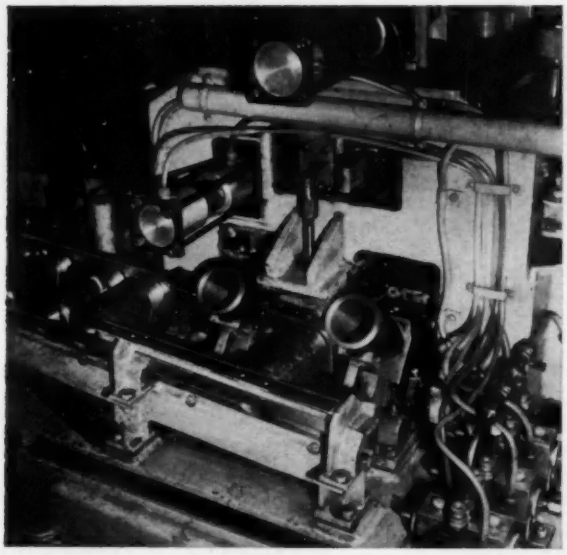
Liners are now advanced to position (3) where a pair of vertical pneumatic rams drop into the bores and grip them internally with expanding chucks. Now the fingers release and the liners are thrust downwards into the empty fixtures directly below at position (A) on the rotary table.

As this table indexes, carrying the incoming work to idle position (B), completed liners from (D) are transferred to (A). There they are picked up by the pneumatic rams, gripped by the fingers at (3), and, after the rams withdraw, are carried to unload position (4) as the "square" transporter continues its cycle.

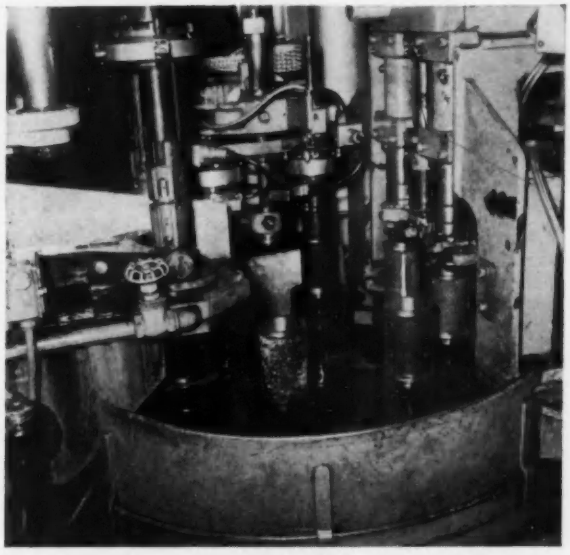
Moving on to work position (C) the liners are clamped in their loose fixtures by pneumatically-operated yokes bearing down on location rings that seat against the top flanges. Honing with electro mechanical stroking follows, and continues until size is reached as detected by air gages in the twin cutting heads, which in fact control the actual cycle time.

When the honing spindles retract and the work is unclamped, liners are swung around to position (C) where Solex air gages plunge into the bores. Size readings from these gages are recorded on punched tape to give a continuous indication of honing operation and limits.

Liners are then carried to (A), transferred to (3) as described before, and finally on to unload position (4). There they are released and tilted from vertical to horizontal by pivoting mechanisms similar to those at (1). The spaced-out cylinders now roll together onto a small swivelling platform between the tilters which rotates 90 degrees and deposits the liners on



First and third liners on the feed track are tilted to vertical for presentation to the pneumatic gripping fingers on the indexing loader.



Work table with four double stations, showing the honing spindles at the left and the transfer position for loading and unloading at the right. Gaging station is behind and idle position is in front.

the upper end of the inclined exit chute.

This unit is the latest addition to the production line for these components, which is already highly automated, with individual machines linked by a series of continuously-moving conveyors. Small pallets each carrying one liner circulates on the loop track; alternate pallets function as "in" and "out" transporters, and are mechanically identified by a left- or right-hand tab that extends below the conveyor.

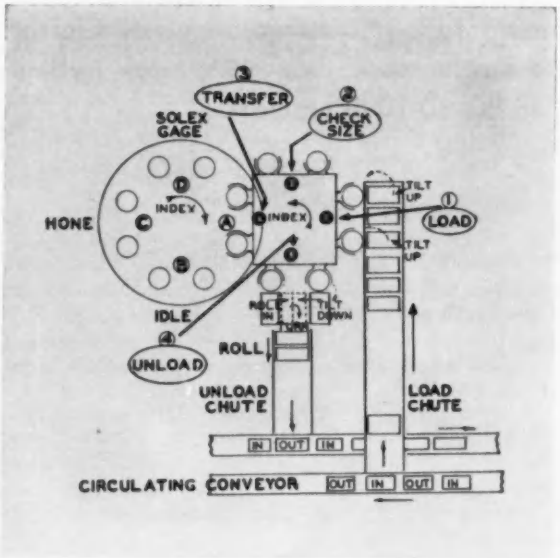
In the case of the honer, as each "in" pallet passes the machine it actuates a microswitch that triggers a kicker, pushing the liner sideways into the load chute. Similarly, "out" pallets operate an escapement mechanism on the unload chute so that a liner is released to roll onto it.

When the load chute is full an interlocking feeler breaks the circuit to the kicker, causing "in" liners to pass on along the track. In the same way, normal exit of an outgoing liner is blocked whenever a passing "out" pallet is already full.

This conveyor circuit also serves two hand-loaded semi-automatic honers on the same work, since the new machine alone is insufficient to meet requirements for the Dauphine whose current output is approaching 2000 a day. ■

Alternate "in" and "out" pallets on the circulating loop conveyor carry liners past the honing machine. "In" liners are kicked off the appropriate pallets on the upper level into the gravity feed chute, while honed liners on the outgoing chute below are released singly into empty "out" pallets.

Arrangement of equipment for automatic honing of cylinder liners



Complex Problems are Solved in Small Gas Turbine Manufacturing

AiResearch Manufacturing Division of The Garrett Corporation has made more than 9000 gas turbines in the 30-1000 hp class

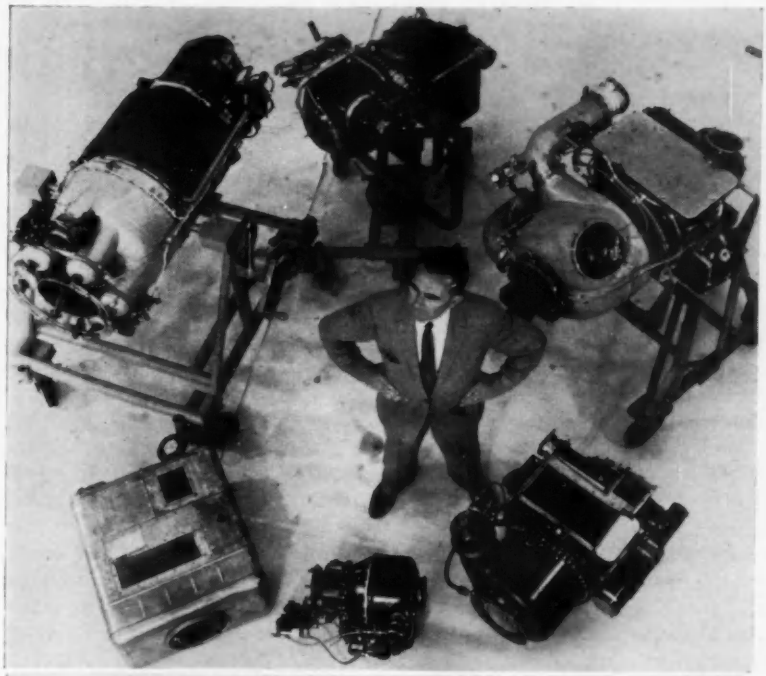
By JACK LEWIS
Corporate Director, Manufacturing,

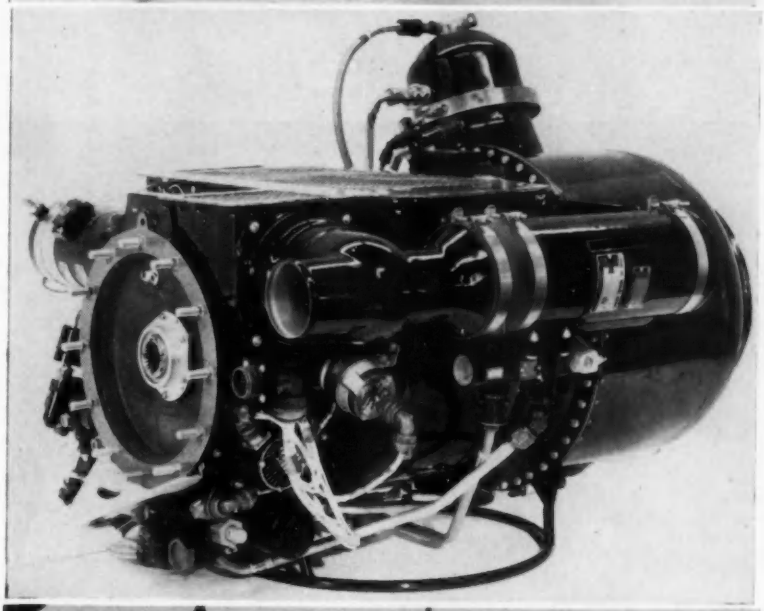
THE GARRETT CORP.
Phoenix, Arizona

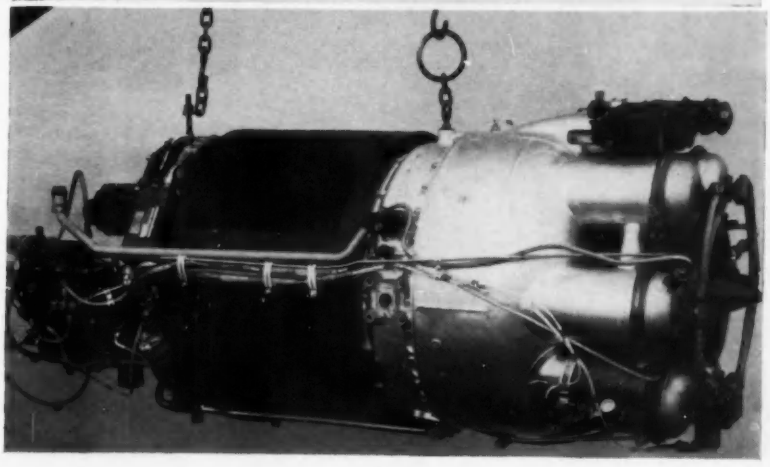
VETERAN producer of small gas turbine engines is The Garrett Corporation's AiResearch Manufacturing division in Phoenix, Arizona. To date the aircraft component firm has manufactured and sold more than 9,000 gas turbines in the 30-1000 horsepower class.

AiResearch's original turbine was developed in 1946 as an outgrowth of the firm's aircraft engine driven compressors for cabin pressurization during World War II.

Initial contract was with the U. S. Navy Bureau of Aeronautics in 1948 and the unit was installed on board the Consolidated XP5Y turboprop flying boat. Function of the airborne unit was to supply compressed air for starting the aircraft as well as heating, cooling, anticing and driving an air turbine alternator.







TOP—
AiResearch chief engineer, Helmut Schelp, is surrounded by six typical gas turbine engines produced by the Arizona firm. Output of the units varies in capacity from 30 to 850 hp.

MIDDLE—
Model GTP70 AiResearch gas turbine produces continuous 70 to 150 hp for use in 30, 45 and 60 kw generator sets

BOTTOM—
AiResearch 105 gas turbine produces air flow of 210-225 lb per/min and shaft power from 125 up to 850 hp.

Primarily Military

Produced as compressor, shaft power, and combination compressor-shaft power units, the AiResearch turbines have been developed primarily for military applications and matured with the military and commercial jet age.

Current applications include airborne and ground support auxiliary power units for aircraft and missiles; lightweight generator sets; prime movers for helicopters and various petroleum applications.

The basic design of the gas turbine features a single stage centrifugal compressor, a reverse flow combustion chamber and a single stage radial-inflow turbine.

With a minimum of moving parts, the gas turbine is easy to maintain and simple in design. This simplicity and the turbine's lightness of weight gives more power per pound of engine weight than reciprocating engines. It can also be very compact.

Burning gasoline, Diesel fuel, butane, natural gas, kerosene, the gas turbine operates efficiently in any climatic condition from 130 F to —65 F with no need to warm up. It is a ready source of compressed air or shaft power or a combination of both simultaneously. Plus the fact that its hot exhaust gases are an excellent source of heat.

Disadvantages have been high initial cost and high fuel consumption. Current applications tend to be tailored to take advantage of the turbines plus points when the advantages outweigh the initial cost per unit or its high fuel consumption.

Manufacturing Problems

Manufacturing problems solved by Garrett's Arizona division in the evolution of this new power package entailed economic barriers as well as fabrication techniques.

The relatively high cost of a gas turbine engine limits the present day market of the units and necessitates short manufacturing runs. And of course the short runs sustain the high cost of the individual unit.

One fourth of the cost of the small jet is wrapped up in the control system and accessories, such as the starter motor, fuel package, multi-speed switch and generator.

In order to offset these economic difficulties flexibility is a requisite in the manufacturing process. AiResearch Phoenix's shop area is in fact a super job shop with some unique embellishments.

Parts are machined, processed, analyzed and stored awaiting assembly all under one roof in the AiResearch plant which houses 700,000 sq ft of work area.

Standard machines are adapted by special tooling to a wide variety of cutting operations.

A complete gear department producing spur, helical, and spiral bevel gears; grinding operations including thread and form; automatics including single and multi-purpose and the latest Swiss; air tracer engine lathes; multi-spindle, and radial plus conventional drilling machines; complete protective processes including anodizing and plating; heat treat; and painting shops are all part of the AiResearch manufacturing operations.

Automation Used

Phases of automation appear in the use of multi-spindle automatics and tape control equipment. Special setups make use of Pratt Whitney Kellers, Cincinnati Hydrotels and Nassovia die sinkers.

Inherent manufacturing problem with this type of short run work is product mix. With about 10 basic gas turbines produced in both compressor and shaft power versions in numerous varied models, as well as components for air turbine starters and motors, the work pattern on an individual machine is varied indeed.

The nature of the aviation business itself results in an unusually high rate of design and manufacturing changes. On one new model AiResearch turbine there were 270 manufacturing design changes during a 60 day period.

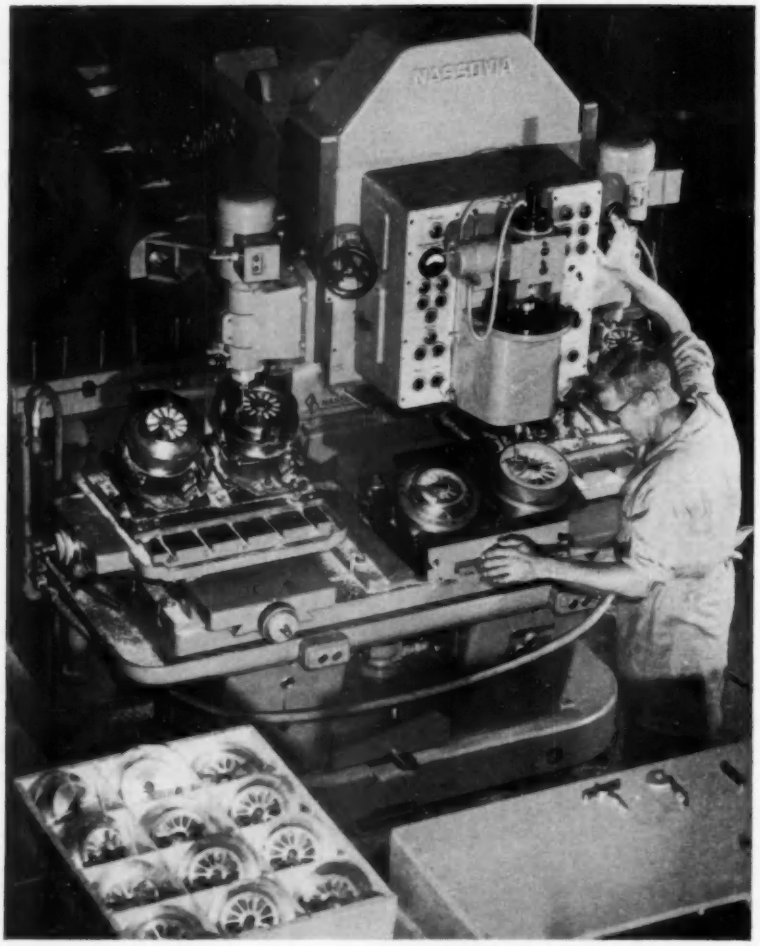
Aircraft usage demands extreme reliability for flight safety. Destructive testing and Zyglo, Magna flux, X-ray and ultrasonic inspections increase the check points in the manufacturing process.

Precision is Vital

Three additional areas present perhaps the really major problems for small gas turbine engine production. In addition to the discussed short run and product mix complications the very nature of the gas turbine with its high speed, its high temperatures and its need for precision manufacture are ever present in the turbine regardless of quantities.

Normal operating speeds of the gas turbine engines are in the 40,000 rpm range. Machining techniques are necessary to insure metal forms and structures to take the high stress. Quality raw stock, special alloys, centrifugal castings, unique extrusion and cutting methods are all part of the AiResearch

(*Turn to page* 98, *please*)



Multiple machining of gas turbine impeller wheels is held to ten-thousandths of an inch tolerance on a Nassovia die sinker.

T-J

LAUNCHES A NEW CUTTING TOOL LINE FOR MILLING ACCURACY

For precision milling to close tolerances, so vital in today's high-speed, high-production manufacturing, T-J now offers a new, improved line of milling cutters. The new cutter line features a high helix angle, double back-off, and a right-hand spiral to produce more and smoother cuts between grinds, and a free-cutting, stronger tool.

Specially designed and precision-manufactured for die sinking and production milling, the new line is designed to include flats on the shanks for set screw type drivers on all of the end and side milling cutters.

Write today for complete information to the Tomkins-Johnson Company, Jackson, Mich.

Ask for completely new cutter catalogue No. 259.

T-J TOMKINS-JOHNSON

Circle 139 on Inquiry Card for more data

• • INDUSTRY STATISTICS • •

By Marcus Ainsworth
STATISTICAL EDITOR

WEEKLY U. S. MOTOR VEHICLE PRODUCTION

As reported by the Automobile Manufacturers Association

Vehicle Make	Weeks Ending July 2	Weeks Ending June 25	Year to Date 1960	Year to Date 1959
PASSENGER CAR PRODUCTION				
Total—American Motors	9,700	11,657	278,457	221,655
Chrysler	1,577	1,989	49,016	46,025
De Soto	167	249	15,605	31,749
Dodge	9,833	10,597	240,001	98,928
Imperial	318	405	9,663	11,919
Plymouth	3,905	4,126	147,242	201,464
Valiant	6,262	7,537	155,209	.....
Total—Chrysler Corp.	22,062	24,885	615,936	450,085
Comet	4,081	5,587	77,984	23,552*
Falcon	10,745	12,264	270,219	.....
Ford	18,539	20,071	574,164	843,593
Lincoln	281	282	11,296	16,099
Mercury	2,340	3,184	92,285	84,182
Total—Ford Motor Co.	35,956	41,388	1,025,968	967,426
Buick	5,459	5,843	163,568	143,048
Cadillac	3,435	3,431	91,261	90,796
Chevrolet	30,540	30,112	971,192	901,790
Corvair	1,320	4,785	146,206	.....
Oldsmobile	6,112	6,609	213,139	227,993
Pontiac	9,355	10,016	258,196	251,859
Total—General Motors Corp.	56,221	69,496	1,843,566	1,615,488
Total—Studebaker-Packard Corp.	1,925	2,396	65,223	90,404
Checker Cab	118	121	4,035	2,839
Total—Passenger Cars	125,982	140,923	3,833,215	3,347,897
TRUCK AND BUS PRODUCTION				
Chevrolet	6,778	6,307	239,974	219,276
GMC	2,297	2,584	61,260	48,454
Diamond T	73	75	1,568	3,449
Divco	100	100	2,412	1,972
Dodge and Fargo	1,965	1,856	42,322	44,289
Ford	7,145	8,062	201,416	182,994
F. W. D.	22	21	561	517
International	2,696	2,712	71,176	79,188
Mack	354	355	7,894	8,906
Studebaker	303	381	8,639	7,254
White	380	168	9,857	10,143
Willys	1,948	3,284	78,407	62,030
Other Trucks	90	90	2,235	2,018
Total—Trucks	24,153	25,975	727,721	670,490
Buses	115	85	2,103	1,528
Total—Motor Vehicles	150,250	166,983	4,563,039	4,019,915

*—Edsel production.

1960 TRUCK TRAILER SHIPMENTS

Industry Division, Bureau of the Census

Type of Trailer	April	Four Months 1960	Four Months 1959
Vans			
Insulated and refrigerated	657	2,346	1,787
Steel	103	384	275
Aluminum	554	1,961	1,512
Furniture	286	804	513
Steel	252	714	406
Aluminum	34	90	107
All other closed-top	2,323	10,898	8,783
Steel	619	2,483	2,552
Aluminum	1,704	8,415	6,231
Open-top	283	1,196	767
Steel	54	340	271
Aluminum	229	856	496
Total—Vans	3,549	15,243	11,850
Tanks			
Non- and low-pressure			
Petroleum and aircraft refuelers			
Carbon and alloy steel	126	599	860
Stainless steel	17	91	93
Aluminum	258	752	544
Total—Petroleum	401	1,442	1,497
Chemical, food, and sanitary	82	254	143
Dry materials	219	534	532
High-pressure (LPG, chemicals, etc.)	25	104	126
Total—Tanks	727	2,334	2,298
Pole, pipe, and logging			
Single axle	21	78	121
Tandem axle	116	348	306
Total	137	426	427
Platforms			
Racks, livestock, and stake	12	85	158
Grain bodies	119	596	572
Flats, all types	936	3,799	3,122
Total—Platforms	1,067	4,480	3,852
Low-bed heavy haulers	238	786	894
Dump trailers	179	533	902
All other trailers	341	1,356	939
Total—Complete Trailers	6,238	25,156	21,162
Dump trailer chassis[1]	105	347	.....
Trailer chassis only[1]	498	1,363	1,735
Total—Trailers and Chassis	6,841	26,866	22,897
Detachable van bodies[1]	412	1,051	960

[1] Sold separately.

NEW PASSENGER CAR REGISTRATIONS BY REGIONS*

Zone	Region	April 1960	March 1960	April 1959	Four Months 1960	Four Months 1959	Per Cent Change Apr. over March	Apr. over Apr. 1959	Four Months 1960 over 1959
1	New England	40,413	30,048	33,072	115,911	91,148	+34.49	+22.20	+27.17
2	Middle Atlantic	127,343	109,628	105,812	405,896	342,282	+16.16	+20.35	+18.59
3	South Atlantic	86,051	78,519	68,816	294,673	255,118	+ 9.59	+25.05	+15.50
4	East North Central	163,816	151,655	153,412	551,697	480,110	+ 8.02	+ 6.78	+14.91
5	East South Central	28,137	31,321	24,788	103,602	89,362	−10.17	+13.51	+11.59
6	West North Central	54,337	50,438	60,555	177,699	176,246	+ 7.73	−10.27	+ .82
7	West South Central	46,524	50,453	40,039	174,335	163,891	− 7.79	+16.20	+ 6.37
8	Mountain	23,194	19,201	19,183	74,085	69,882	+20.80	+20.91	+ 6.01
9	Pacific	77,472	75,406	69,245	270,352	250,380	+ 2.74	+11.88	+ 7.98
	Total—United States	647,287	596,669	574,922	2,168,250	1,918,419	+ 8.48	+12.59	+13.02

States comprising the various regions are: Zone 1—Conn., Me., Mass., N. H., R. I., Vt. Zone 2—N. J., N. Y., Pa. Zone 3—Del., D. of C., Fla., Ga., Md., N. C., S. C., Va., W. Va. Zone 4—Ill., Ind., Mich., Ohio, Wis. Zone 5—Ala., Ky., Miss., Tenn., Zone 6—Iowa, Kan. Minn., Mo., Neb., N. D., S. D. Zone 7—Ark., La., Okla., Tex. Zone 8—Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo. Zone 9—Alas., Cal., H. I., Ore., Wash.

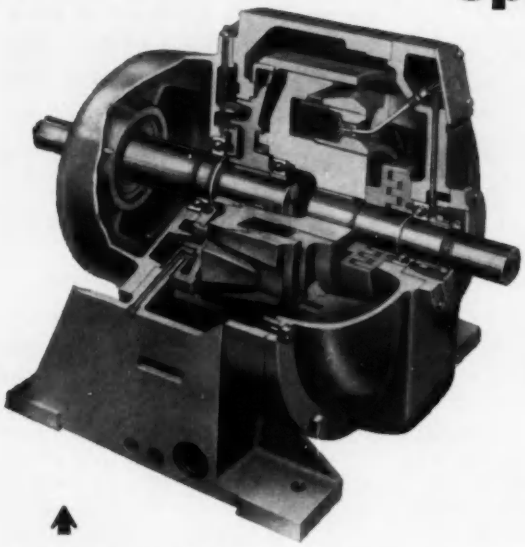
* Compiled from official state records. Data property of R. L. Polk & Co. May not be copied, sold or reprinted without Polk permission.

1960 TRUCK FACTORY SALES BY G.V.W.

As reported by the Automobile Manufacturers Association

Period	6,000 lb. and less	6,001-10,000 lb.	10,001-14,000 lb.	14,001-16,000 lb.	16,001-19,500 lb.	19,501-26,000 lb.	26,001-33,000 lb.	33,000 lb. and over	Total
First Quarter	205,990	56,758	3,747	9,305	55,290	20,834	10,805	10,037	372,375
April	61,711	18,583	1,019	3,326	15,457	6,847	4,011	3,638	114,590
May	65,362	17,411	1,016	2,850	16,675	6,788	3,466	3,455	118,023
Total—Five Months—1960	333,672	92,752	5,782	15,481	87,422	34,469	18,282	17,128	604,988
Total—Five Months—1959	271,165	87,879	6,868	46,213	64,606	27,093	17,970	17,478	539,237

The BEST Solution to Difficult Speed Control Problems—

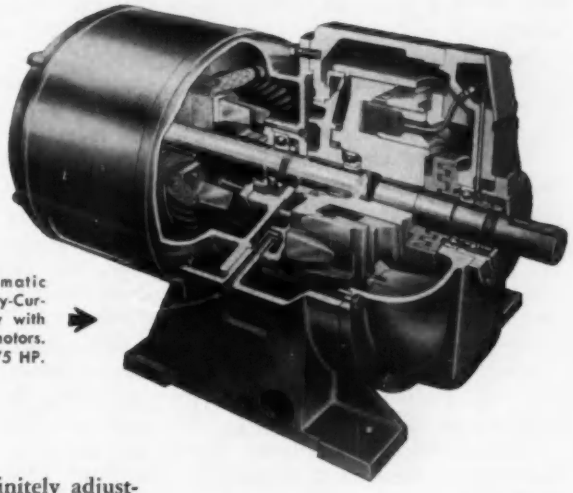


Dynamatic Liquid-Cooled Couplings provide infinitely adjustable speeds for nearly every application from 3 to 75 HP. Note the absence of slip rings, brushes, and commutators. Heavy-duty types with capacities up to 5,000 HP are also available.

EATON

DYNAMATIC®

LIQUID-COOLED EDDY-CURRENT COUPLINGS and DRIVES



"Dynaspede" Drives are Dynamatic Liquid-Cooled, Stationary-Field Eddy-Current Couplings mounted integrally with standard, D-flange, squirrel cage motors. Available in capacities from 3 to 75 HP.

Here's Why—

Dynamatic Liquid-Cooled Couplings and Drives provide infinitely adjustable speed from a constant speed source—or constant speed from a variable speed source. They operate on standard alternating current. Rotary power is transmitted through the coupling by an electromagnetic reaction between the driving and driven members of the unit—there is no mechanical contact of rotating members to cause wear and require adjustment or replacement.

A wide range of standard and special control features may be obtained from a remotely-mounted electronic control system. Infinite speed adjustment, constant speed control, on-off clutch control, torque limit, acceleration control, inching, and threading are a few of the many functions available. The addition of an eddy-current brake to standard couplings or drives provides smooth, cushioned stops and controlled deceleration.

Liquid-Cooled Dynamatic Couplings and Drives deliver more horsepower than other types of the same physical size, thus conserving space in a busy machine area. Efficient heat dissipation permits continued operation at low speeds, or stall with full load.

Completely enclosed, Dynamatic liquid-cooled units are protected from dust, dirt, and other atmospheric impurities. Dynamatic design involves no brushes or slip rings; there is no possibility of arcing. With simple modification these units can be made explosion-resistant for hazardous applications.

Infinitely Adjustable Speeds from AC Power

★

Full-Torque Starts

★

Wide Range of Control Functions

★

No Slip Rings, Brushes or Commutators

★

Completely Enclosed Design

★

Low-Cost Maintenance

Send for Our New Illustrated Bulletin.

EATON

DYNAMATIC DIVISION
MANUFACTURING COMPANY
3307 FOURTEENTH AVENUE • KENOSHA, WISCONSIN

News of the MACHINERY INDUSTRIES

By Charles A. Weinert

More Than One-Third of the Net New Orders for Machine Tools Booked in May were from Foreign Sources. Orders from Abroad in 1st Five Months Total $68.65 Million

Machine Tool Sales Only Fair in May

Following the $10 million decline in net new orders which took place in April over March, machine tool sales in May continued almost unchanged.

In May the net new orders for metal-cutting machines rose $1.3 million, but orders for metal-forming machines dropped $3.35 million.

Particularly significant is the fact that foreign orders for both cutting and forming machines represented more than one-third of the total orders placed.

Preliminary figures from the National Machine Tool Builders' Association indicate the May cutting machine net order total was $38 million, of which $26.4 million was in domestic and $11.6 million in foreign orders. The forming machine total was $11.8 million, made up of $6.15 million domestic and $5.65 million foreign orders.

Combined, the metal-cutting order segment of $38 million plus the forming segment of $11.8 million totaled $49.8 million. For April the combined net new order figure was $51.85 million as finalized. In May 1959 the equivalent total was $48.7 million.

Thus far this year (first five months), net new orders from foreign sources total $68.65 million, while domestic orders have totaled $212 million. It will therefore be seen that foreign orders accounted for 24 per cent of the total orders placed with U. S. machine tool builders. Add this order situation to the fact that foreign machine tool shipments in the first five months of this year totaled $44.6 million.

Considering that foreign manufacturers can be assumed to be also buying machine tools abroad, these statistical data appear to be additional evidence that foreign makers are taking further steps to expand and make more efficient their production operations. It might also be concluded that they are ordering American machines in most cases mainly to obtain the advantages of the U. S. machine tool industry's automation technology not available abroad—and may be aiming to excel productivity-wise the facilities in this country.

With respect to the figures on shipments—in May these were at the same rate as in the prior months. Metal-cutting machine shipments are estimated at $44.1 million, while metal-forming machine shipments are given at $10.4 million, for a combined total of $54.5 million. In April, total shipments as finalized came out at $55.1 million; and for the first four months averaged $54.49 million. For comparison, shipments in May 1959 totaled $41 million.

Machine Tool Exposition Plates and Registration

With some of the machines already being set in place for the big event—The Machine Tool Exposition-1960 (Chicago, Sept. 6-16)—prospective visitors might well take a minute or two to become familiar with the setup for registration.

Apparently there has been some misunderstanding or confusion created by the fact that there are two forms to be filled out.

One of the forms is for the purpose of obtaining, in advance of the Exposition, an Inquiry Timesaver Plate. This particular form should be filled out as soon as possible, and mailed before August 8. Forms for the plate have been widely distributed, but if not on hand can be obtained from the National Machine Tool Builders' Association, 2139 Wisconsin Ave., Washington 7, D. C., or from your machine tool company representative. The main points here are that this form should be *mailed in* quickly—and that it is *not* a preregistration for entering the exhibition.

The second form is for registra-

(*Turn to page* 118, *please*)

METAL CUTTING AND FORMING MACHINE TOOLS

Net New Order Receipts

(Millions of Dollars)

	Foreign			Domestic			
1960	Cutting	Forming	Total	Cutting	Forming	Total	Totals Combined
Jan.	$9.40	$2.00	$11.40	$34.05	$11.00	$45.05	$56.45
Feb.	12.30	1.80	14.10	35.40	11.10	46.50	60.60
Mar.	11.90	2.45	14.35	36.55	11.05	47.60	61.95
Apr.	7.80	3.75	11.55	28.90	11.40	40.30	51.85
May	11.6*	5.65*	17.25*	26.40*	6.15*	32.55*	49.80*
5 Mos.	53.0*	15.65*	68.65*	161.30*	50.70*	212.00*	280.65*

* Preliminary.

Source of Statistics: National Machine Tool Builders' Assn.

GREATER RUN-IN PROTECTION EXTENDS PISTON LIFE OF CURTISS-WRIGHT ENGINES

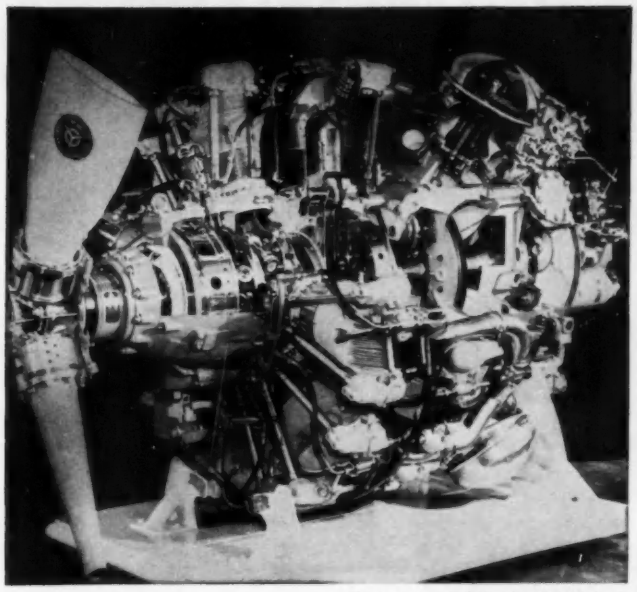


Photo courtesy of Curtiss-Wright Corp.

Curtiss-Wright Corporation's Wright Aeronautical Division, located at Wood-Ridge, N.J., has extended the "life span" of pistons used in their radial reciprocating airplane engines. By coating piston skirts with 'dag' 213 — a dispersion of graphite in an epoxy-resin binder — they are protected against scuffing, scoring, galling, and seizing during the critical running-in period.

Where previously Curtiss-Wright engineers had used finely powdered graphite and phenolic resin, they found that 'dag' 213 was more uniform in consistency and had better adhesion . . . was actually adsorbed by the surface to form a more durable, corrosion-resistant film that became virtually integral with the metal. Due to the heat-transmission properties of 'dag' 213, the coefficient of friction is kept at a uniform minimum to assure free action and proper wear-in characteristics. The exacting clearances in reciprocating engine design make the run-in process so critical that perfect friction and heat control must be maintained under the speeds and loads required. In addition, the graphoid surface takes over the job of supporting the load if the liquid lubricant ruptures momentarily during run-in, thereby preventing metal-to-metal contact until the oil film re-establishes itself.

'dag' 213 is spray-applied at Curtiss-Wright with conventional spray equipment. After the piston skirts are coated, the preassembled pistons are oven-heated at 350°F for 2½ to 3 hours. Fabrication and treatment techniques used at Curtiss-Wright permit a high degree of accuracy in maintaining piston and cylinder wall tolerances. Only forged aluminum alloys are used for these pistons which operate within nitrided steel cylinder walls. The application of Acheson's 'dag' 213 has been extended to all models of Curtiss-Wright engines in both their 18 and 9-cylinder categories. Investigate the use of an Acheson Dispersion in your own assembly or run-in application. Write Dept. AI-70.

New Literature Describes Assembly and Run-in Uses

The value of Acheson Dispersions as additives in assembly and run-in lubricants is described in easy-to-read form in a recently printed brochure, Bulletin 421. A copy for your personal file is available immediately upon request.

It covers the many advantages Acheson customers are gaining in these critical applications by using colloidal dispersions which:

1. Provide smoother bearing surfaces through control of the wear rate.
2. Permit closer tolerances due to their microscopic, flat particle size.
3. Allow increased power because of reduced friction.
4. Lower bearing temperatures.
5. Increase the affinity of mating metal surfaces for oil.
6. Lessen oil consumption.
7. Shorten the period necessary for run-in.
8. Protect against momentary oil failure.
9. Lower maintenance and replacement costs.
10. Insure a longer, more trouble-free equipment operating life.

If you are concerned with the design or manufacture of engines, motors, bearing assembly, or machinery, Bulletin 421 should prove of interest to you. The vital contribution which Acheson Dispersions of colloidal graphite or molybdenum disulfide make in safeguarding against excessive wear during running-in, is a matter of record. Also, Acheson dry film lubricants, used in assembly press fit applications, are providing effective lubrication without sacrificing the tolerances involved. Send for your copy of Bulletin 421, "For Assembly and Run-in Lubrication".

'dag' is a trademark registered in the U.S. Patent Office by Acheson Industries, Inc.

ACHESON

dispersions digest reporting uses for

dag® BRAND DISPERSIONS

ACHESON *Colloids Company* **PORT HURON, MICHIGAN**

A division of Acheson Industries, Inc. Also Acheson Industries (Europe) Ltd. and affiliates, London, England

Offices in:

Boston • Chicago • Cleveland • Dayton • Detroit • Los Angeles • New York • Philadelphia • Pittsburgh • Rochester • St. Louis

NEW PRODUCTION and PLANT EQUIPMENT

By C. J. Kelly
ASSISTANT EDITOR

FOR ADDITIONAL INFORMATION, please use reply card at back of issue

Drilling Attachment

DESIGNED for application on both ram and saddle type turret lathes, a new drilling attachment will handle drills up to ½ in. with

a number 2 Morse taper. This unit features a choice of four speeds in two combinations. It is available with a range of 340, 510, 625 and 945 rpm, or 530, 865, 1045 and 1615. A swivel electrical connector permits the gun driller, as it has been named, to rotate freely with the turret without tangling the lines. This device uses a ¾ hp 3/phase 220/440 V motor and comes equipped with a foot switch. *The Ward-Riddle Co.*

Circle 50 on postcard for more data

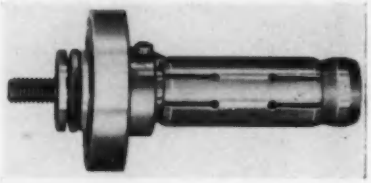
Expanding Arbor

A NEW type of expanding arbor, made of special steel, has been designed in various sizes and lengths.

At either end of the arbor is a split-type sleeve. The grooves in the sleeve are either in-line or staggered, depending upon the length and size of the arbor, in order to provide the maximum gripping power, and to assure a precision fit.

The grooves are filled with a special plastic which expands and contracts as the arbor is used. This plastic remains intact during the lifetime of the arbor, and keeps chips, grinding dust and dirt from reaching the splines, shafts, gears, etc.

The split ends of the arbor expand independently of each other, up to 0.006 in. The amount of expansion can be different at each end of the



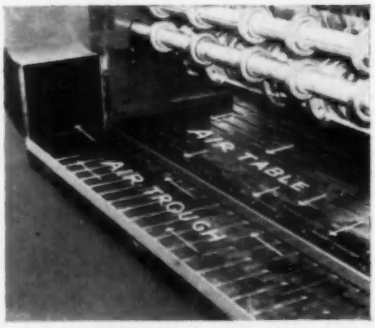
arbor, depending upon the part to be positioned. *LaSalle Machine Tool, Inc.*

Circle 52 on postcard for more data

Air Conveyor

A CONVEYOR system moves material at speeds of up to 2,000 FPM on a cushion of air. The system has a level load capacity of up to 30 lbs/sq ft., depending upon the materials conveyed, and operates at inclines to 45 deg.

The absence of moving parts is



said to eliminate wear, cleanup costs, and safety hazards. The system can be installed or built in and around machinery, or wherever space and safety factors preclude the use of moving bed conveyors.

Operation is achieved by metering low-pressure air through special louvers, which direct an air flow along the carrying surface of the container. *Engineers Associated.*

Circle 53 on postcard for more data

Fork Truck Claimed To Be Largest Ever Made

Six Ford Falcons are less than half a load for this new industrial truck. It has a load capacity of 35 tons. The first five units manufactured will be delivered to the Ford Motor Company's Steel Division to handle steel slabs at temperatures up to 2000 deg. F. This fork lift has been named the Ranger, and is being produced at the Industrial Truck Division of the Clark Equipment Company.

Circle 51 on postcard for more data

Travel Head Welder

A SPECIAL travel head seam welder has been developed to transfer a blank from the load position into the forming unit, where it is formed into a shell and the side seam is welded. After the weld is consummated the forming clamps release and the transfer mechanism ejects the welded part from the machine. The finished seam is approximately five inches long. The weld pressure is approximately 1200 lb at 60 psi. Weld speeds are adjustable from 200 to 400 in. per minute, and a 200 KVA welding transformer supplies the welding power.

The manufacturer reports this unit will produce 500 automobile air vent outlets per hour.

The machine operates in the following manner:

The operator loads the flat sheet blanks into the locators on the transfer system, and it is then transferred into the forming position where it is formed into a shell. When forming is completed, it is then seam welded along the overlap edges. After the seam welding is completed, the clamps automatically release and the transfer ejects the part from the machine. *The Federal Machine and Welder Co.*

Circle 54 on postcard for more data

Roller-Conveyor Network

A VAST roller conveyor network system has been installed in a storage battery manufacturing plant to eliminate the annual losses due to sulfuric acid corrosion. The system is 2650 ft long and consists of 18,600 feet of linear rollers and shafting which are fabricated from Byers type I PVC pipe. Rollers are Schedule 40 1½ in. pipe and vary in length from 8 to 16 in. Special plastic bushings cemented inside the roller ends accommodate the roller axles which are fabricated from Schedule 80, ¼ in. pipe. *Scranton Battery Co.*

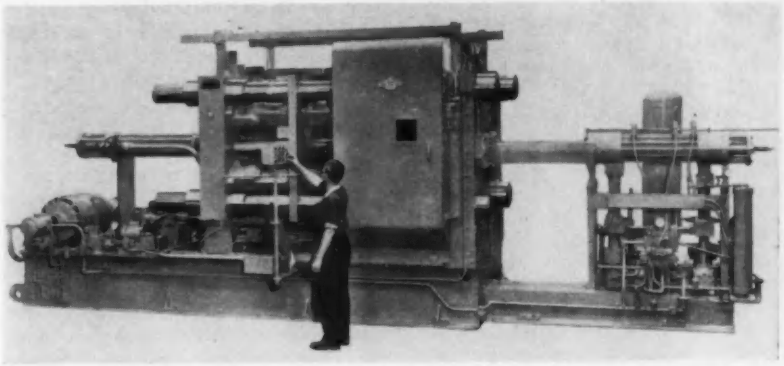
Circle 55 on postcard for more data

Gravity Feed Oiler

AN inexpensive sight gravity feed oiler has been developed to accurately dispense the proper amount of oil needed for any specific application. It is of the sight level type, and is equippped with an on-off toggle lever. It is available in both glass and plastic reservoirs, in six standard sizes. *Gits Bros.*

Circle 56 on postcard for more data

Huge, Cold Chamber Die Casting Machine



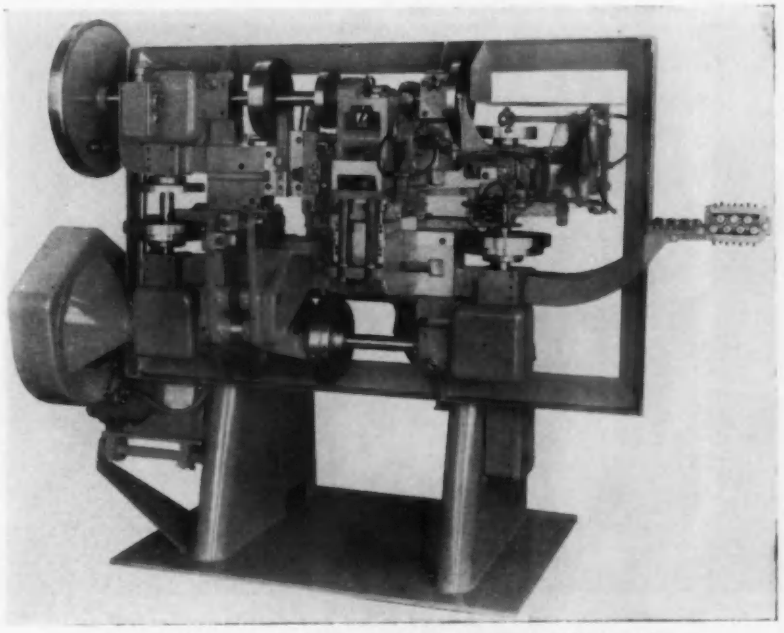
A new 1000 ton die casting machine checks out at 1200 tons lock-up pressure on the strain-gauge test. The manufacturer reports that the four corner linkage design of this unit results in exceptional platen stability. This machine weighs 85,000 lbs, and overall dimensions are 8½ by 26 by 10 ft high. The four tie bars measure 8 in. in dia. B and T Die Casting Div., Greenlee Bros. and Co.

Circle 57 on postcard for more data

All-New concept in the Metal Forming Field

A METAL and wire forming machine has been developed from an all new concept according to the manufacturer's report. The bed of this machine is mounted on two narrow pedestal-type legs to allow the incorporation of automatic receiving equipment such as a conveyor, rotary table stacking units or other devices that may be needed as an integral part of the operation. This unit will accept feed lengths up to 8½ in., wire diameter mild steel to 3/32 in. and ribbon metal stock widths to 1½ in. This inclinable ribbon and wire forming machine is capable of operation from any angle—horizontal 0 deg to vertical 90 deg. Production operations with this unit range from 75 to 300 parts per minute at normal speed with a variable speed drive. This can be increased to 400 parts per minute by incorporating high speed cams and short feed. *The Baird Machine Co.*

Circle 58 on postcard for more data



Machine features a bed opening of 5½ in. long by 4½ in. wide.

NEW PRODUCTION and PLANT EQUIPMENT

New Industrial Process

A NEW type of industrial process involving nuclear reaction on a small, controlled scale has been developed.

Used primarily for spray coating with molten metals, ceramics, etc., the new process uses temperatures as high as three times that of the sun's surface, according to the company. As a result, almost any noncombustible material on earth can be vaporized and sprayed over another object. In the higher temperature ranges the process is called "plasma flame."

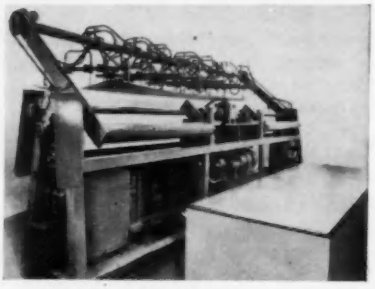
The new process promises exceptional advantages for coating objects that are to be subjected to extremely high temperatures and to unusual abrasion and corrosion. *Allied Engineering and Production Corp.*

Circle 59 on postcard for more data

Overarm Sheet Feeder

FEEDING sheets from a pile to processing or conveying equipment, or conversely, for piling sheets as they come from production can be effectively accomplished with a new large size overarm feeder. This unit was designed to handle a variety of materials up to 6 by 20 ft.

The feeder grasps sheets by means of vacuum cups supported on a carrier which is mounted between two oscillating arms. As the arms rotate from one side of the machine to the other, they first lower the carrier to engage a sheet on one side, and then transfer carrier-and-load to the other side, where the



vacuum is released and the sheet deposited. The carrier automatically returns for another sheet unless the machine is set for single cycle operation.

The first of the new large-size feeders is in use at an *Alcoa* plant, to handle metal sheets. The vacuum cups are positioned to peel the oily sheets at the corners first, and the arms pivot at a slow initial rate and accelerate to a higher rate once the sheet has been separated from the pile. The feeder is designed to handle up to 10 sheets per minute. *The de Florez Co., Inc.*

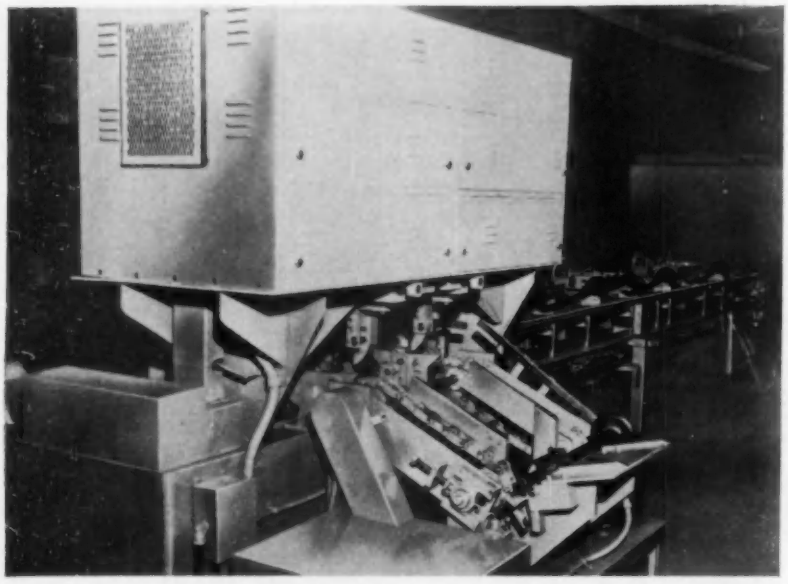
Circle 60 on postcard for more data

New Axle Shaft Forging Inspection Machine

THIS new unit, designed specifically for dimensional checking of axle shaft forgings, illustrates the capabilities of the RCA electronic gaging system in the inspection of rough forgings or castings. Employing the standard "off-the-shelf" type gaging modules, the machine checks the shaft for run-out (three places) and out-of-roundness (two places) as well as OD and length. The flange is inspected for thickness (360 deg) and run-out in reference to the shaft. Operating at speeds of up to 600 parts an hour, the axles are automatically classified as acceptable or reject, the latter in six categories. Sizes handled range from 28 to 33 in. in length, and 6 to 8 in. in flange diameter.

Among the outstanding features are dependability and high reliability. Control panel gives a continuous visual presentation of the operation at all times. The same unit can be used for inspection of finished axles.

RCA Industrial and Automation Division also manufactures a wide range of automatic machines and systems for high speed gaging, inspection, selective segregation, hardness testing and assembly, as well as self-compensating grinder controls. Other support items for systems are elevating feeders and orientors, rotary hoppers, non-mar feeders and electronic comparators. *Radio Corporation of America, Industrial and Automation Div.*



Rear view of machine that was designed to test axle shaft forgings at 600 per hr.

Circle 61 on postcard for more data

Ultrasonic Control

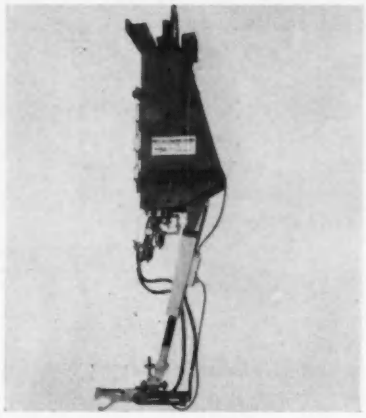
VARIOUS control operations, such as counting, sorting, routing, machine safeguard, hopper and bin level control, can be accomplished with a new electronic product. Known as

Sonac, it will sense liquids, solids, ferrous and non-ferrous metals. This is a non-contact sensing and switching system that uses ultrasonic energy for its beam. *Delavan Mfg. Co.*

Circle 62 on postcard for more data

Press Unloader Arm

A SWINGING arm-type press unloader will remove stampings from a press at the rate of 40 strokes per minute, with 45 psi air line pressure. This unit is attached to the crown of the press, and is electrically controlled by the press. The arm provides a smooth, non-dipping



unloading stroke that is controlled by a heavy-duty air cylinder. This line is available in three models. *Press Automation Systems, Inc.*

Circle 63 on postcard for more data

Granite Surface Plates

A SPECIAL line of oversize granite surface plates for precision measurement of large parts is now available.

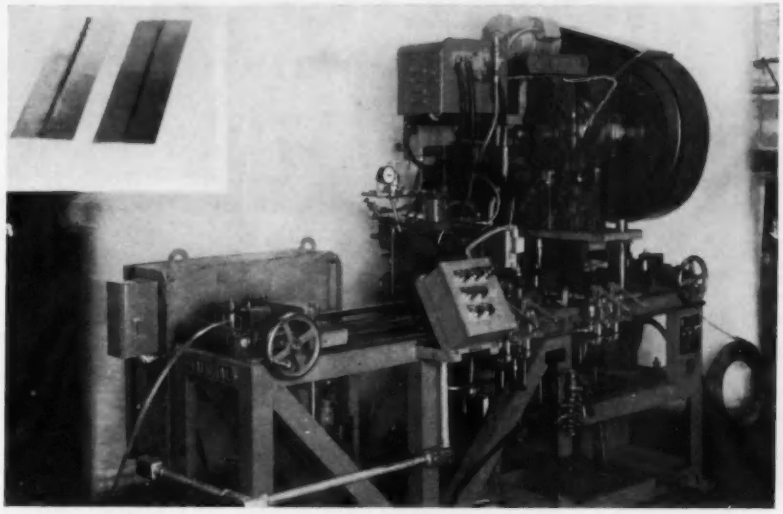
These oversize plates have been designed to meet the needs of heavy machinery and equipment manufacturers requiring accurate and extensive reference surfaces. Constructed entirely in one piece, they eliminate the problems often encountered in lining up several small surface plates to create one large reference surface.

They are manufactured with an automatically controlled finishing machine that propels large lapping plates, weighing as much as 4,000 pounds, to smooth and polish the final surface. This improved finishing method produces a uniform overall accuracy and eliminates the waves that can result from hand finishing with small lapping plates.

Oversize granite surface plates are manufactured from Balfour pink and Mr. Airy gray quartz granites to assure dimensional stability and long life. A complete range of surface plate sizes is available up to 50 ft long. *The Herman Stone Co.*

Circle 64 on postcard for more data

Semi-Automatic Strip Welder Uses Tungsten Inert Gas



Designed to join the ends of rolling mill strips in a wide range of thicknesses, a new strip welder features weld speeds of 20 in. per min on 0.020 stock. Materials of 1/8 in. thicknesses can be handled at 6 in. per min. Tooled with a Mig welding head, this unit will weld thicknesses up to 3/8 in. National Electric Welding Machines Co.

Circle 65 on postcard for more data

Polishing Machine Features Rotary Conveyor Design

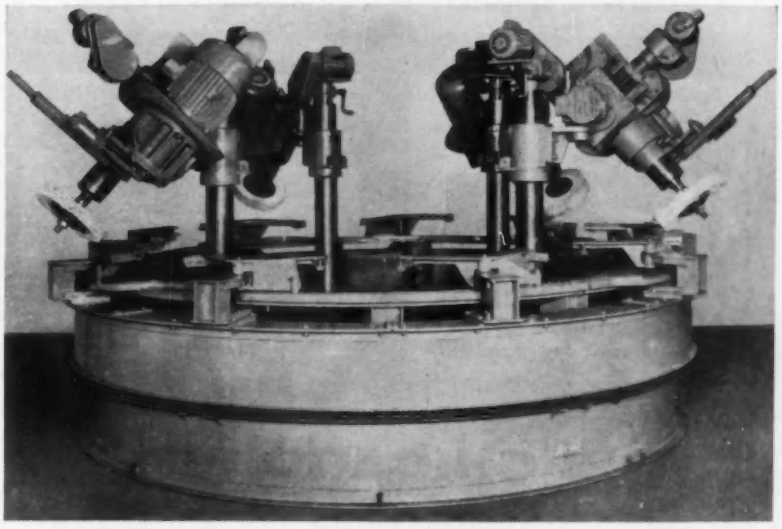
A NEW automatic polishing and buffing machine features a rotary conveyor design which cuts floor space requirements for finishing high production parts.

Parts such as automobile moldings, and related types having sweep or angular shapes, are ideally adapted to finishing on these rotary conveyor automatic finishing machines. The parts are loaded and unloaded from one position on the periphery of the machine.

The 12 ft dia machine consists of a rotating outer conveyor ring and a stationary inner ring. Work pieces are mounted on fixtures on top of an 8 in. wide table on the rotating ring and move past buffing wheels mounted on adjustable lathes spaced around the inside of the conveyor. Cam rails mounted on the stationary inner ring can operate in conjunction with pivoted fixtures to move the part to controlled positions at various stations around the periphery of the machine. *Acme Mfg. Co.*

Circle 66 on postcard for more data

(*Turn to page 162, please*)



Twelve ft rotary conveyor type automatic polishing and buffing machine

HEADQUARTERS

for tough valve gear problems

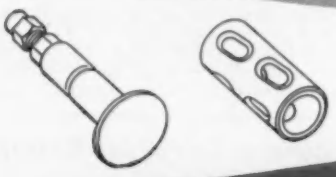
When you're facing difficult problems involving valve gear, the men to see are Chicago's tappet engineers. For, in 25 years of specialization on valve train parts, we have encountered and solved many problems similar to yours.

Applications, such as those illustrated, are typical examples . . . and the operational records established by Chicago tappets of all types in more than 25,000,000 engines are the best testimonial to their success in meeting the toughest industry requirements.

Even when your engine does not present unique requirements in valve gear design, checking with Chicago can often assure a performance bonus. Chicago's hydraulic tappets, for example, assure longer trouble-free life, reduced starting noise, and quieter operation.

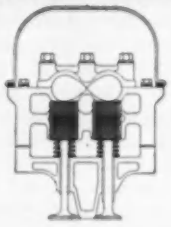
For Any Engine

Car, truck, tractor, diesel . . . aircraft, outboard, power mower, or industrial . . . whatever your type of engine, big or small . . . it will pay you to consult Chicago's development engineers *while you are still in the preliminary design stages.*

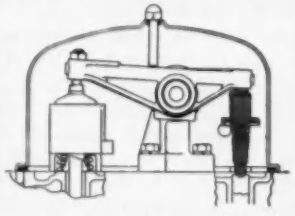


Write or wire our Tappet Division today

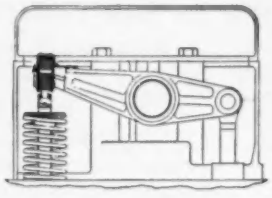
Hydraulic and Mechanical Tappets (Barrel or Mushroom Type) of Alloy Steel, Hardened Alloy Cast Iron, Chilled Iron, or Alloy Chilled Iron • Push Rods • Adjusting Screws



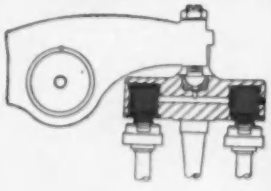
Hydraulic Inverted Cup Type Unit



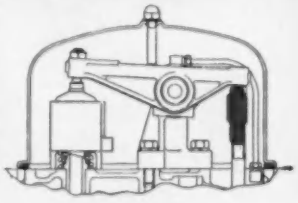
Push Rod Type with Compression Release Application



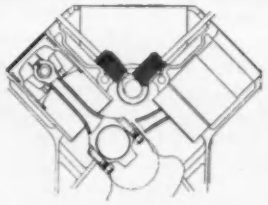
Threaded Type Rocker Arm Unit



Dual Valve T-Bridge Hydraulic Application



Hydraulic Unit on End of Push Rod



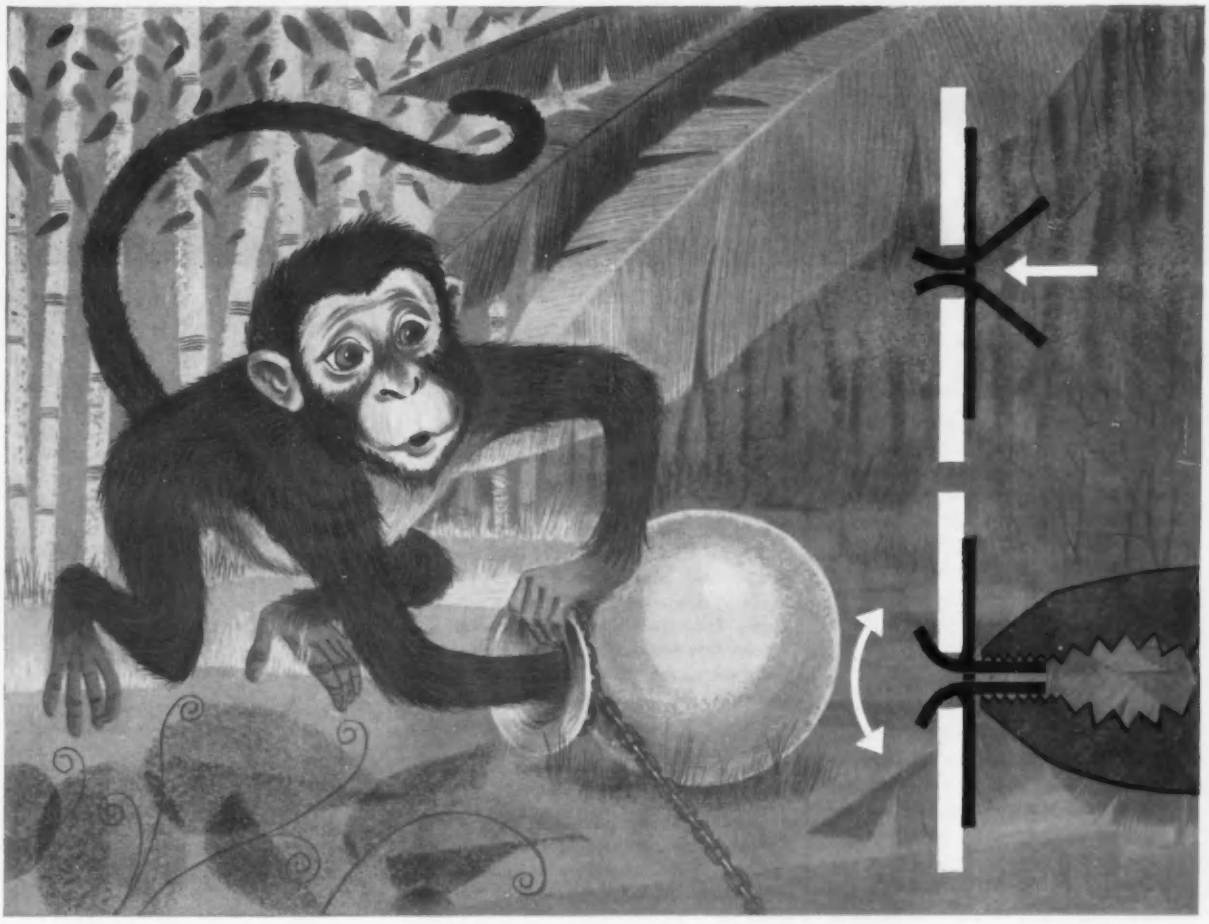
V-8 Automotive Hydraulic Tappet Application

THE CHICAGO SCREW COMPANY

ESTABLISHED 1872 • DIVISION OF STANDARD SCREW COMPANY

2701 WASHINGTON BOULEVARD, BELLWOOD, ILLINOIS

Circle 142 on Inquiry Card for more data



TRAPPED BY A GRIP THAT WON'T LET GO!

See how Tinnerman "pinch-grips" hold front-mounting attachments; no special equipment needed

Typical of Tinnerman *new approaches to old problems* are "pinch-grip" SPEED CLIPS—permitting front-of-panel applications in a second's time. SPEED CLIPS are simply inserted into mounting holes and a plier's pinch gives permanent retention.

SPEED CLIPS can increase production rates, eliminate rejects, cut assembly costs as much as 50%. Many different features may be incorporated in the SPEED CLIP design to fasten cables, wire harness, rubber feet, mouldings, and for scores of other assemblies.

You may have a fastening problem that can be solved—or a product which can be improved—by this SPEED CLIP principle. Your Tinnerman specialist (see the Yellow Pages) can furnish samples and help you in many ways. Or write:

TINNERMAN PRODUCTS, INC.
Dept. 12 • P. O. Box 6688 • Cleveland 1, Ohio

TINNERMAN
Speed Nuts®

FASTEST THING IN FASTENINGS®

CANADA: Dominion Fasteners Ltd., Hamilton, Ontario. GREAT BRITAIN: Simmonds Aerocessories Ltd., Trefforest, Wales. FRANCE: Simmonds S. A., 3 rue Salomon de Rothschild, Suresnes (Seine). GERMANY: Mecano Bundy GmbH, Heidelberg.

NEW PRODUCTS AUTOMOTIVE-AVIATION

FOR ADDITIONAL INFORMATION, please use reply card at back of issue

By C. J. Kelly
ASSISTANT EDITOR

Nylon Gas Line

The application of nylon tubing as a connecting line from the fuel tank to the fuel pump has been use-tested and proved to be successful under the most severe road conditions. Some of the advantages pointed out are the ease of installation, the elimination of flexible connections and the fact that this material does not need to be performed. The gasoline lines installed on the test automobiles were made from ¼ in. Nylon 6 tubing, with a wall thickness of 1/32 in. Temperature tests applied to this tubing showed no failure in a range of +100 deg F to −20 deg F. *Spencer Chemical Co.*

Circle 40 on postcard for more data

Solid Film Lubricant

Solid film lubricants have been developed and tested, and are designed to operate without deterioration when exposed to nuclear irradiation of the order of 1×10^7 Roentgens up to 1×10^9 Roentgens at temperatures up to 550 deg F. Not only are these solid film lubricants unaffected by exposure, but wear life properties after exposure are actually increased by over 30 pct. When the exposure was 3×10^{14} NVT up to 3×10^{16} NVT, the wear life was unaffected.

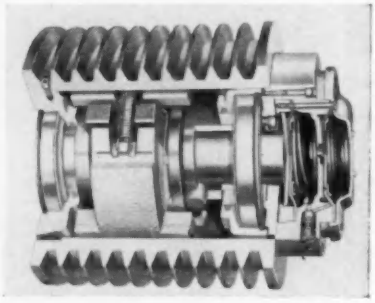
These Electrofilm dry film lubricants are also corrosion resistant, and lubricate efficiently in temperatures from −65 to +1800 deg F. Their friction and wear life properties are such that they can meet Mil Spec 25504. *Electrofilm, Inc.*

Circle 41 on postcard for more data

Transmission Accessory

Serving three purposes in electric or gasoline engine drives, a new transmission accessory combines an automatic clutch, adjustable torque selector and variable starting time delay. Available in sizes from 3 to 2000 hp capacity, the drive unit is said to eliminate the need for oversize and special type motors, expensive starters and, at the same time, protects the power unit and the driven mechanism.

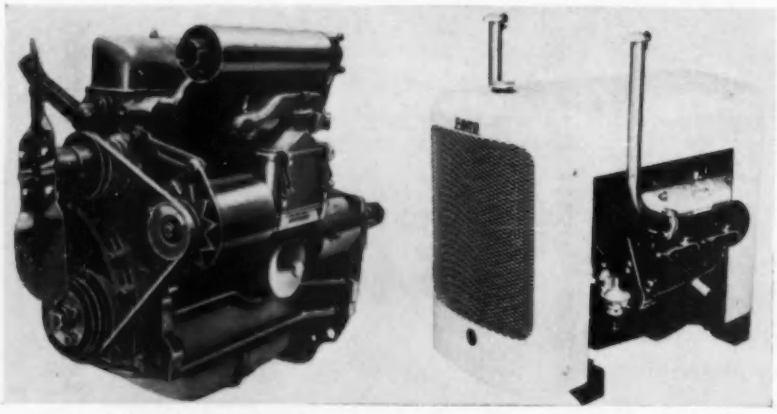
Power-Max is the name given this centrifugally-operated clutch which may be adjusted both for maximum torque transmitted and time delay in "picking-up" the driven load. A feature pointed out by the manufacturer



is the fact that, with this unit the "starting load" is completely eliminated, even in applications normally having exceptional starting loads. Power requirements never exceed those of the normal running load. *Olme Precision, Inc.*

Circle 42 on postcard for more data

Interchangeable Parts Featured on Industrial Engines



Two new industrial engines have been introduced as ready-to-run power units, complete with instrument panel, radiator and sheet metal housing. One unit is a 292 cu in. gasoline engine and the other is a 172 cu in. four cylinder Diesel. The Diesel model features parts that are interchangeable with the manufacturers 172 cu in. gasoline engine, including cylinder sleeves, exhaust valve seat inserts, intake and exhaust valve guide bushings and hard-faced exhaust valves. The Ford Industrial Div., Ford Motor Co.

Circle 43 on postcard for more data

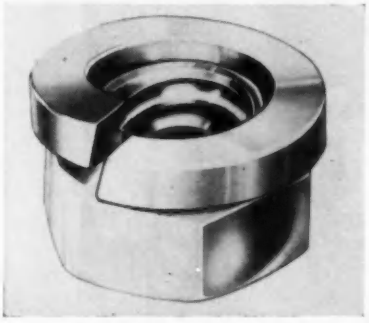
Portable Outdrive

A portable outdrive designed for application on either automotive or marine engines up to 150 hp is suitable for use on boats of 15 ft length and up. Named Seapower, this unit weighs about 70 lbs. A radical departure in the design of this drive is the mounting of the propeller forward of the unit so that it pulls rather than pushes. Almost square turns and great maneuverability are possible since the propeller and rudder both move in a 360 deg rotation. The manufacturer predicts a future unit will be designed for much more powerful hp engines. A beaching bar on the Seapower holds the outdrive in a raised position if it should contact with underwater obstacles, the bottom or the beach. *Western Gear Corp.*

Circle 44 on postcard for more data

Nut and Spring

A combination nut and helical spring washer is permanently held together, but free to rotate when pressure is applied. The outstanding feature of this development is the incorporation of the helical spring washer. This combination was designed to give



a good reactive range and high spring tension.

High reactive ranges and spring pressure could mean a considerable reduction in the incidence of failure in bolted assemblies due to bolt stretch, thread creep, and linear dimensional changes caused by rapid thermal expansion or contraction. *Eaton Mfg. Co.*

Circle 45 on postcard for more data

Preformed Molded Fibre

Automobile door sections, instrument panels and other parts of the interior can be fabricated from preformed molded fibre in cost-saving one piece production. This is accomplished by employing a process that utilizes high strength synthetic fibers such as fiberglass, Nylon, Dacron or Orlon. In this process the fibers of nature and those made by man are suspended in a slurry, drawn on a preformed die, molded, and bonded by thermoplastic and thermosetting resins. The final achievement of this operation is the hand-tooled custom-upholstered look. *Hawley Products Co.*

Circle 46 on postcard for more data

Miniaturized Motor

A miniaturized motor, has been designed to allow the direction of rotation to be established by electrical control alone.

Designated as the 42100 series, this 5 oz device was designed for applications where reliability, performance and space are of prime consideration.

Length of these motors is only ⅞ in., making them the shortest motors available, the company claims, with no sacrifice in running torque, nominally specified as 30 oz in. Available in voltages ranging from 6 to 230 V at 20 ma maximu, the unit's rotor speed is 300 rpm with output speeds of 300 rpm to 1/6 rph. *The A. W. Haydon Co.*

Circle 47 on postcard for more data

Shaft Type Oil Seal

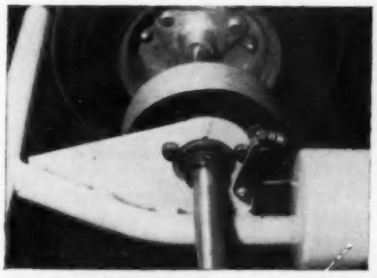
A new shaft type of oil seal that avoids what has been recognized as major causes of oil seal leakage is now available.

The new unit, called the C/R Scotseal (self-contained omni-purpose type), claims an entirely new concept in oil seal design. The oil sealing lip is secured and completely enclosed so that it seals within the unit and does not contact the shaft. The sealing surface, normally a responsibility of the user, is provided by the seal. In effect, the new seal is a self-contained oil sealing, dirt excluding cartridge. *Chicago Rawhide Mfg. Co.*

Circle 48 on postcard for more data

Racing Kart Brakes

An internally expanding shoe-type brake has been designed for application on racing karts. According to the manufacturer, the new mechanically actuated brake, complete with



actuating lever and stamped drum, weighs less than four lb.

It's reported to have double the braking power needed to stop a 500 lb kart with driver, when traveling at a speed of more than 60 mph. *The Bendix Products Div., Bendix Corporation.*

Circle 49 on postcard for more data

NEWS FEATURES

(*Continued from page* 51)

Synthetic Rubber Use Continues to Rise

Use of synthetic rubber in the United States continues to rise and latest estimates point to 1960 consumption of 1.1 million long tons according to J. W. Keener, president of the B. F. Goodrich Co. This is a 4.5 per cent increase over 1959's record high.

At the same time, Mr. Keener indicated use of natural rubber would probably decline by two per cent because of its higher current price.

Growth of synthetic rubber usage since Goodrich introduced the first synthetic rubber tire 20 years ago is a chemical miracle, Mr. Keener said. "Man-made rubber got its greatest impetus as a war-time replacement for natural rubber, then unavailable," he stated. "But continued improvement has made it superior to natural tree rubber in many products, especially passenger car tires."

Since the June 5, 1940 introduction of Goodrich's Ameripol tire, which contained more than 50 per cent synthetic rubber, American motorists have used up 12.2 million long tons of synthetic rubber. Of this total, 4.7 million long tons have been consumed since government synthetic rubber plants were purchased by private industry in 1955.

Loening Retained By Curtiss-Wright

Grover Loening, a pioneer in U. S. aviation, has been retained as consultant to Curtiss-Wright Corp. Loening's aviation career began in 1911.

He holds many airplane patents and received among other awards, the Collier Trophy, Distinguished Service Medal, Wright Memorial Trophy, Medal of Merit and USAF Exceptional Civilian Service Medal.

Link-Belt's narrow automobile timing chain started...

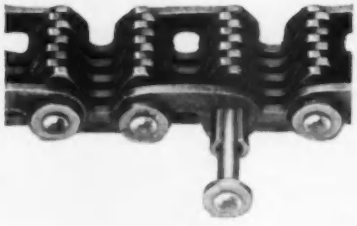
an 11-year economy run

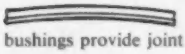
Narrow chain accommodated 100% hp increase, saving millions in production costs

Introduced in 1949, Link-Belt's narrow, ½ inch pitch timing chain is still "in time" with today's higher horsepower, higher compression engines. Even with the 100% increase in horsepower over the last eleven years, the exceptional durability of this chain has helped keep engines running smoothly, quietly, and dependably.

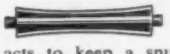
Today, this narrow timing chain is the choice of three of the four major auto manufacturers. It's been time-tested and performance-proved in millions of car miles.

Link-Belt engineers are readily available to help you find the potential savings in applications of Link-Belt narrow timing chain for your engines in the planning stage. For the complete facts and economic advantages, write for Book 2065. 15,301




Bowed segmental bushings provide joint snugness.


After initial assembly in chain, bushings are straight.


Bow in bushings acts to keep a snug joint on nonload side, arresting chain whip, providing a smoother, quieter, long-life drive.

ORIGINATED BY LINK-BELT, the bushed joint and free rotating pin were designed for quietness, smoothness and long life. Millions of cars on the highways attest to the success of this design. Note absence of connecting links and solid guide links that add weight to chain and increase centrifugal loading.

LINK-BELT

TIMING CHAINS AND SPROCKETS

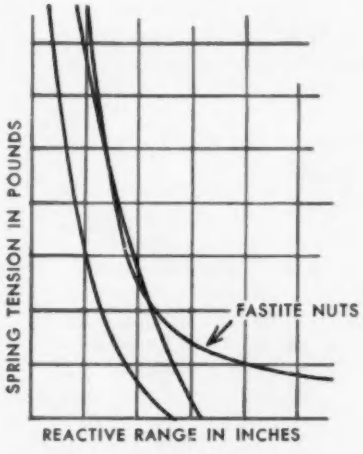
LINK-BELT COMPANY: 220 South Belmont Ave., Indianapolis 6, Ind.

Circle 144 on Inquiry Card for more data

new

EATON-RELIANCE

FASTITE NUTS



Here is the answer to the growing need by designers and production men for more efficient fasteners on bolted assemblies. The Fastite assembly is a combination nut and helical spring washer, permanently held together, but free to rotate when pressure is applied.

Although it can be applied with equal or better speed than similar fasteners, the biggest advantage of the Fastite nut is the incorporation of the helical spring washer which provides a much greater reactive range and tension than other types of washers now being used.

Of three fasteners tested, the comparative release curve analysis showed the Fastite nut exerted 100 pounds more reactive spring tension when tight than either of the other two fasteners. More interesting, however, from the viewpoint of assembly problems is that the other fasteners lost all reactive spring tension when backed off to .016 inches whereas the Fastite nut still registered 150 pounds. In fact, the Fastite nut still showed reactive tension at .070 inches. The comparative curves are shown at left. A detailed graph of these curves is available for your inspection in the Engineering Bulletin offered below.

Translated into terms of product quality, this simply means the Eaton-Reliance Fastite nut is the best fastener available to reduce the incidence of failure in bolted components due to the ever present problems of bolt stretch and thread wear. Specify Eaton-Reliance Fastite nuts on your next order.

Send for Fastite Nuts Engineering Bulletin, no obligation.

EATON

RELIANCE DIVISION
MANUFACTURING COMPANY
553 CHARLES AVENUE • MASSILLON, OHIO

SALES OFFICES: New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Los Angeles

Circle 145 on Inquiry Card for more data

Observations

By Joseph Geschelin

Molten Metal

Over a period of but a few years Reynolds Metals has participated in three major aluminum projects where a Reynolds reduction plant has been built adjacent to an automotive aluminum foundry. By locating both foundry and reduction plant less than a mile apart and near a source of hydroelectric power, Reynolds is able to provide an unfailing supply of molten aluminum. First of such operations —at Jones Mills—serviced a General Motors light metal foundry, now operated by the Central Foundry Division. This was kept under wraps and has had no publicity up to now. The second operation was the Ford aluminum foundry in Alabama, served by the Reynolds plant at Lister which received hydroelectric power from Muscle Shoals. The most recent operation to be publicized was the Chevrolet aluminum foundry at Massena which, together with the adjoining Reynolds plant, is a part of the St. Lawrence Seaway complex.

Blown Plastics

Automatic blow molding of certain forms of plastic parts is a recent technique receiving attention in the industry. We understand that it is being employed in the making of parts from linear polyethylene formulations. We are told that the process at this writing has been applied to bottles and containers, one form being the containers for windshield washer fluid. While there may be other ways of employing this technique, we find that one is to extrude the plastic and, while the extrusion is still hot, to feed it directly into a blow mold where the final form is produced. The method is said to have production advantages and it will be interesting to see how its applications can be extended.

September Showing

It is none too early to plan attendance at the Machine Tool Exposition—1960 which will be held in Chicago in September. Held at five-year intervals, this Exposition, sponsored by the National Machine Tool Builders' Association, will be a preview of the new developments of tomorrow born of the inventive genius of the machine tool industry. Many of the machines, shown at the time, will be in automotive plants either immediately or in changeovers in the near future. If past experience is any guide, the art of metal cutting and the economies associated with it will get another large boost.

Stifling Progress

A Democratic presidential candidate (excuse the political reference) and a Michigan official addressed large union meetings in Michigan in June, both on the same subject. Worried about the impact of automation, which they claim has displaced 100,000 jobs in Michigan, they promise a halt to this "pernicious" trend. They feel strongly that any progress in production efficiency will have to be curbed by negotiation with the unions involved. In effect, further production improvements would have to be approved by collective bargaining. Perhaps later the politicians could pass a law making it necessary to get a license to install improved methods. Admittedly it is trite to say that history repeats itself. But this is exactly what the workers in England tried to do at the beginning of the Industrial Revolution. In the days when everything was done by hand, the workers were led to believe that the introduction of power and machinery would eliminate their jobs. It is true that machine methods following that period eliminated certain crafts and skills. But look how the whole world has grown and prospered since the early days of the Industrial Revolution. And progressively how the sweat and toil of workers has been eliminated through machine methods that remove manual effort.

SMTS Machines

Buhr has the distinction of producing the first transfer machine of uncommon flexibility built to the Special Machine Tool Standards (SMTS) promoted by the industry users' committee. Starting where the present building block concept leaves off, SMTS equipment has the mounting base of all heads on a transfer machine of uniform dimensions. Thus heads can be interchanged anywhere on the base or can be replaced with other heads when a product change is made.

Aches Pains

Recent news report quotes a prominent physician to the effect that he has had a number of patients complaining of an incidence of backaches and pains in joints. In all instances, this medic learned by questioning that the pains were of recent origin and occurred in patients driving small foreign imports. What floored this physician was that when the patient was told that his pains doubtless were due to being cramped in a doodlebug, the patient seemed relieved—and went back to driving his pet. Can there be greater customer acceptance than this? ■

PICK A TERMINAL ANY AMP TERMINAL

For the world's finest reliability

Teeth-jarring circuit vibration a problem? How about searing temperatures, 1000F° plus? Maybe metal-eating salt spray or corona is your circuit nemesis.

No matter what the problem is or where . . . by specifying AMP, you can pick the exact solderless terminal for your requirements from the broadest line on the market—whether you require the great production speed of an AMP Automachine or the small run productivity of an AMP precision hand tool.

In fact when you specify AMP, you pick the surest route of all to consistent, economical circuit reliability. If you want a better way to design and manufacture your circuits, send for the full story on AMP's solderless termination program.

AMP INCORPORATED

GENERAL OFFICES: HARRISBURG, PENNSYLVANIA

AMP products and engineering assistance are available through subsidiary companies in: Australia • Canada • England • France • Holland • Italy • Japan • West Germany

Circle 146 on Inquiry Card for more data

new LONG LIFE PISTON

Puts CAST IRON WEAR IN TOP RING GROOVE

G and E Wire Insert Piston before machining (left) and after ring grooves are cut (right) showing how the steel wire forms a tough wear-resistant surface on both faces of top ring groove. The ferrous plug molded in the head (for diesel pistons) prevents burning through head and lengthens diesel piston life!

G and E WIRE INSERT PISTONS

★ **Low initial cost— Low cost per mile**

★ **Amazing increase in piston life**

★ **Maintains new engine power and performance**

Here's an entirely new piston design that combines all the advantages of aluminum alloy pistons with the long life of steel in the top ring groove. No noticeable increase in weight. G and E Wire Insert Pistons are real top performers at LOW COST—barely more than ordinary alloy pistons!

This Gillett & Eaton exclusive steel wire insert cuts top ring groove wear and greatly increases mileage between overhauls.

You get longer piston wear at lower cost because G & E Wire Insert Pistons have a pre-shaped steel wire cast right in the piston wall where the top ring is located. When the grooves are machined, this tough wire is cut, exposing the closely spaced hard surfaced bearing points on top and bottom faces of the groove.

CAST IRON

ALUMINUM

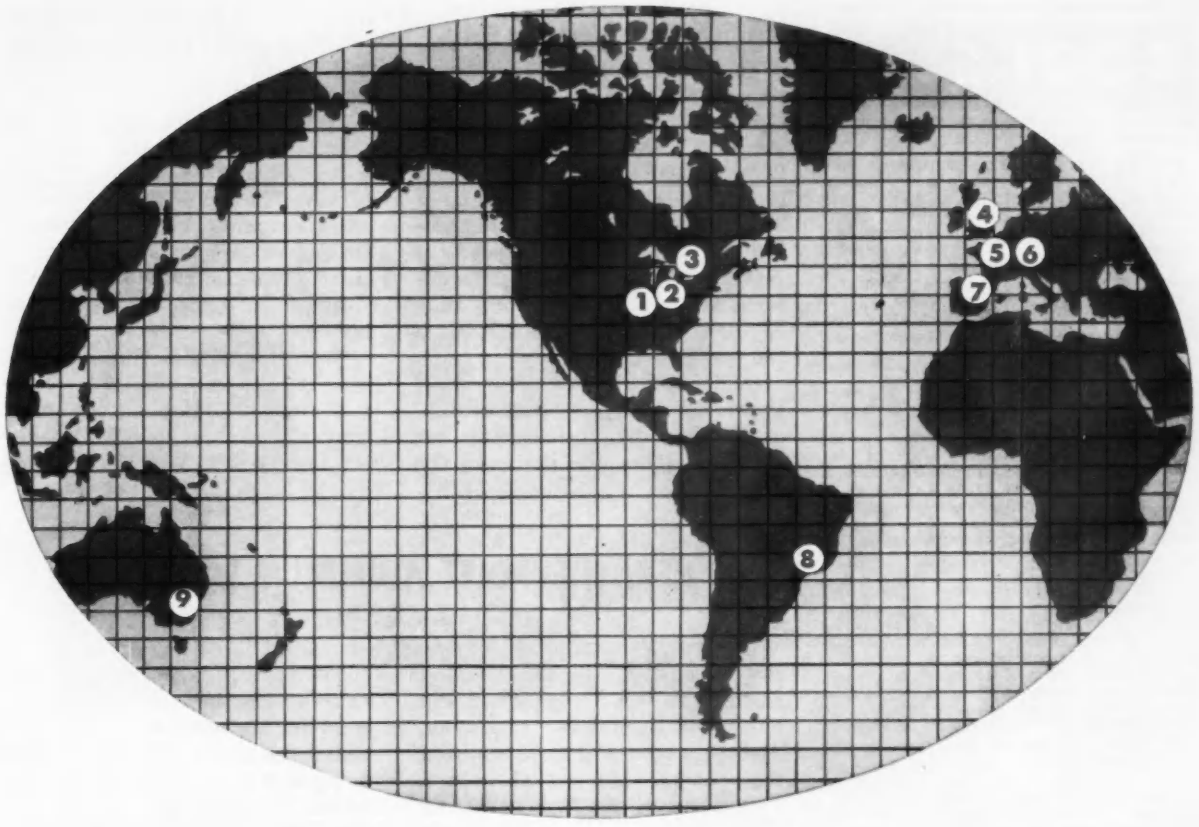
GET THE G AND E WIRE INSERT STORY—it will save piston money, maintenance costs, and cut operating costs.

GILLETT AND EATON, INC. 841 DOUGHTY STREET • LAKE CITY, MINN.

SOLD IN CANADA BY GOULD NATIONAL BATTERIES OF CANADA, LTD., FORT ERIE, ONTARIO

ESTABLISHED 1868

Circle 147 on Inquiry Card for more data



good steering gets around...

Shown here are Divisions of Ross, plus companies associated with Ross either through partial ownership, license or engineering service agreements:

1. Ross Division, Lafayette, Indiana
2. Gemmer Division, Detroit, Michigan
3. Ingersoll Machine & Tool Co., Ltd.
   Ingersoll, Ontario, Canada
4. Cam Gears Ltd., Luton, England
   Hydrosteer Ltd., Luton, England
5. Gemmer-France, Suresnes (Paris), France
6. Zahnradfabrik Friedrichshafen A. G.
   Schwabisch Gmund, Germany
7. Motor Iberica S. A., Barcelona, Spain
8. Ross Gemmer Gear Do Brasil Ltda., Sao Paulo, Brazil
9. Steerings Pty. Limited, Mascot, N. S.W., Australia

Ross provides a gear for every steering need—manual or power, constant or variable ratio. Ross invites *your* inquiry.

Ross **STEERING**

ROSS GEAR AND TOOL COMPANY, INC. • LAFAYETTE, INDIANA
Gemmer Division • Detroit

Circle 148 on Inquiry Card for more data

BOOKS . . .

PERFORMANCE STUDIES OF STRAIGHT TRUCKS AND TRUCK TRACTOR SEMI TRAILER UNITS, *by Prof. A. H. Easton, Department of Civil and Mechanical Engineering, University of Wisconsin, Madison, Wis.* This is Report No. 6 by Prof. Easton and presents the results of six years of research on stability, tire wear, steering, stresses in a frame, brake timing and standard engineering performance tests.

AEROSPACE FACTS AND FIGURES (1960 edition), *edited by Ben S. Lee and published by American Aviation Publications, Inc., 1001 Vermont Ave., N. W., Washington, D. C. Price $2.00.* The eighth edition of the official publication of the Aerospace Industries Association of America, Inc., has been published for use as a standard aviation reference work for legislators, administrators and managers, editors and writers, analysts and students.

TRANSFORMERS AND GENERATORS FOR POWER SYSTEMS, *by R. Langlois-Berthelot, published by Philosophical Library, Inc., 15 E. 40th St., New York 16, N. Y. Price, $12.00.* Written for the engineering student who has a genuine knowledge of physics, this book is divided into two parts, the first dealing with the transformer and the second with the synchronous machine. The engineer concerned with design and manufacture and the operating engineer also will find it useful.

HIGH-LEVEL MANPOWER IN OVERSEAS SUBSIDIARIES, *by John C. Shearer, published by the Industrial Relations Section P. O. Box 258, Princeton University, Princeton, N. J. Price, $3.00.* Manpower problems of U. S. subsidiaries in Mexico and Brazil are analyzed in respect to the extent to which Americans may be an indispensable asset or an unnecessary liability as full-time resident employees and the upgrading of high-level foreign manpower.

Small Gas Turbine Manufacturing

(*Continuous from page* 78)

process to produce high physicial properties to withstand the high stress factors. The finished turbine wheels and fans are precision balanced and then run at over-speeds in a whirl pit to insure minimum growth characteristics.

Normal internal operating temperatures of the gas turbines range from 1200-1600 F. Alloys to withstand these temperatures such as titanium and Inconel present additional machining problems.

Turbine Components

Because of the high rate of rpm and the demanding air foil design forms the turbine components have to be produced with extreme precision. Tolerances of a ten-thousandth of an inch are held on standard turbine production items. Such critical areas as an involute profile of a gear tooth, bearing bores and shaft diameters are regularly held to this tolerance. As a reference point AiResearch maintains within its plant the only fully equipped standards laboratory in the Southwest.

Oddly enough producing small gas turbine engines is more difficult in terms of internal tolerances than the large jet engines. The small size of the units themselves miniaturizes the housings and compounds the internal design tolerances.

Completed turbine assemblies are given sea level testing in test cells where up to 35 variables of temperature, pressure, speed, torque, vibration power, etc., are recorded simultaneously for a minimum of eight hours per production unit.

Additional environmental testing includes temperature extremes of —75 to +500 F, altitudes from 1000 ft below sea level up to 75,000 ft above as well as dust, salt spray, fungus, vibration and dynamometer testing. ■

NEW CHEVROLET ALUMINUM FOUNDRY

(*Continued from page* 73)

casting quality. To this end, the castings go over a mechanized trim line where operators remove any flash between the fins. In addition, the castings are put through a Pangborn machine for air blasting.

To further assure quality, samples of production castings are routed to the laboratory for physical testing as well as for microscopic analysis of structure. Radiographic examination with the fluoroscope and X-Ray equipment is made on intricate castings that are specified free from porosity. Such examination is directed at detection of shrinkage, cracks, or porosity.

Finally it may be noted that the problems of worker comfort usually encountered in any foundry operation were investigated and solved before the plant was designed. Under the factory floor there is a network of tunnels, serving as air ducts to supply either warm or cool air to all manufacturing areas. In the heating season, up to 375,000 cfm of heated air may be circulated through the tunnels. Heat is provided by 15 oil-fired unit heaters with a combined capacity of 30-million Btu per hour. This is augmented by an additional 9.2-million Btu per hour from ceiling-suspended heaters.

During warm weather, the tunnels carry cool air circulated by the same blowers, supplemented with an additional 125,000 cfm of air.

It may be noted in passing that one of the knotty problems in connection with the mechanical equipment for low pressure casting is in the development of some unique material for the "stalks" or feed tubes. Currently made of cast iron, they have a short life, perhaps a week. Some experimental stalks are being prepared from a fused quartz composition, promising much longer life. Some one can make a pile of dollars by developing a material that will live for months in the environment of the molten aluminum pot.

From Massena the press tour moved on to the Chevrolet-Tonowanda engine plant where about 250,000-sq ft of manufacturing area had been cleared for setting up the production and assembly of Corvair engines. This space was made available primarily by removing the facilities for the L-6 engine. For Corvair they installed some 350 machine tools, many of them rebuilt for the purpose from available surplus equipment. In addition, there is a 600-ft long engine final assembly line.

To take care of increased volume for 1961, we observed a number of new machines, several built by Lamb, which handle the same operations but on machines specifically built for the line. One of these is a transfer machine designed for drilling both ends of the case assembly.

Among the special items of equipment seen here is a double-end ma-

chine for gun-drilling the oil galleries in the two-piece crankcase. Another is an 84-in. Lapmaster for lapping the mating faces of crankcase halves, after machining, to assure an oil-tight joint. This machine has four lapping fixtures, each one holding two pairs of halves. Flatness is held to a tolerance of 0.002-in. across the extreme ends of the casting. The plant also features some simple but ingenious indexing type assembly tables for a number of parts, including the crankcase assembly, which is illustrated.

The final assembly line runs some 600 ft in length and features an array of some 316 special, universal type fixtures, mounted on four-foot centers. Fixture design incorporates Chevrolet car front end steering knuckles and bearings to provide easy swivelling in any plane. The line incorporates some 300 air powered tools and 15 multiple-nut runners of different kinds.

The Corvair engine brought with it some unique problems associated with the machining of aluminum. All of the machine tools were repowered for the high speed, heavy feeds required for the economic cutting of aluminum. In addition, central coolant systems were installed for lubricating the cutting tools and flushing chips.

De-burring of aluminum posed some problems at the start. This was solved by the development of an automatic transfer type de-burring machine, fitted with wire brushes.

A three-stage paint dip system is provided for the painting of sheet metal parts such as engine shrouds and fan belt pulleys. The process, which is fully automatic, eliminates spraying and fire hazards, and supplies a uniform coating of rust inhibitor which dries within five minutes.

The Chevrolet forge shop produces the crankshaft and connecting rod caps. The adjacent foundry which supplies the cast iron cylinder barrels, utilizing a shell mold technique, also makes the exhaust manifolds.

In machining, the crankcase halves are bolted together after the initial operation and are finish machined as an assembly. When this structure reaches the assembly line, one side is attached to the work-holding fixture, then the other half is removed to permit installation of the main bearings and crankshaft. Following this, the outer section is attached securely and assembly operations then proceed without interruption. ■

Meet the AI By-Liners

A brief biographical sketch of the editors and contributors to AI whose by-lines appear regularly

Introducing Joseph Geschelin

JOSEPH GESCHELIN, AUTOMOTIVE INDUSTRIES' Detroit Technical Editor, has served with Chilton Company since 1930—a period of 30 years. His specialty consists of engineering articles and studies in the field of automotive vehicle and parts manufacturing. He is Detroit Technical Editor not only of AUTOMOTIVE INDUSTRIES, but also of MOTOR AGE and COMMERCIAL CAR JOURNAL—which comprise Chilton Publications' "Automotive Group."

Mr. Geschelin received his B.S. in M.E. at Cooper Union, N. Y., and is a licensed professional engineer, State of New York. He became a member of the SAE in 1921, and served as National vice-president of National Production Activity in 1942, having been a member of SAE National Production Activity for about 20 years. He is a past officer of the Philadelphia and Detroit Sections of SAE, and has presented numerous papers on engineering design and manufacturing at National SAE and ASME meetings; at SAE Sections; ASTE; and others.

He is a member of the Engineering Society of Detroit; American Ordnance Association; ASTM Committee D-2, member of the Executive Committee Tech K of ASTM; and organizer and chairman of the Independent Committee for Cutting Fluids, which was later merged with ASTM.

He is also a member of the Detroit Press Club.

From 1942 to 1945 he served as Consultant to the U. S. Bureau of Ships on a nation-wide program for procurement and manufacturing of engines, machinery, and spare parts. From 1947 to 1948 he was lecturer at the Industrial College of the Armed Forces.

Joe, as he is more familiarly known, received the 1940 award by the NIAA for the best continuing series of articles on Manufacturing. He is listed in *Who's Who in Engineering, Who's Who in the Midwest,* and *Who's Who in Commerce and Industry.*

ON OUR WASHINGTON WIRE

The 10 per cent manufacturers' excise tax on new autos, trucks and buses, as well as the eight per cent rate on parts and accessories will continue for another year. As expected, Congress once again postponed for a year scheduled reductions in these war-time taxes. The auto excise levy was scheduled to drop to seven per cent, and the parts and accessories tax to five per cent on July 1. They are now scheduled to change next July 1.

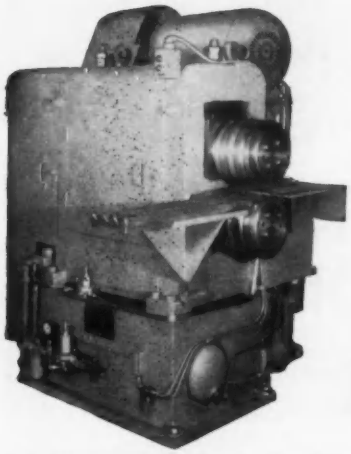
Congress has pared the tax on laminated tires made from scrap rubber for non-highway vehicles by 80 per cent. The action cuts the tax on these tires from five cents a lb to one cent a lb on tires sold after June 1. The tires are used on industrial trucks, tractors, and some off-the-road vehicles.

Penalties for kickbacks from subcontractors to prime contractors are being extended to all negotiated government contracts. The previous kickback ban outlawed the granting of gratuities or gifts by subcontractors under cost-plus-a-fixed-fee government contracts. Under the new ban, any person who either gives or receives kickbacks on negotiated government contracts will be liable to a fine up to $10,000 or imprisonment for not more than two years or both.

The Army, recently designated as contractor for automotive supplies for all military services, is hotly disputing charges of Congressional auditors that it purchased $1.6 billion worth of defective tanks and vehicles. After a four-year study, the General Accounting Office reported to Congress that some 19,000 combat vehicles are seriously deficient and subject to regular breakdowns. The Army says the report contained 429 "errors or half truths."

The Army will let substantial contracts for so-called conventional military hardware in the near future. The new Defense Department money bill provides for tanks, trucks, and other vehicles, plus rifles, and the related hardware for ground troops. Army chiefs pleaded with Congress for the ground troop funds, and the extra orders will total about $200 million. Add this to the $1.3 billion previously voted for replacement of vehicles and weapons, and the Army will spend about $1.5 billion for replacements.

Tax officials have wide discretion in applying depreciation provisions of the 1954 tax law, and may require a taxpayer to use either the physical life or the time retained in computing depreciation. The Supreme Court has ruled on two cases involving depreciation of rental cars and trucks. It upheld the right of the government to require a taxpayer to use useful life or physical life depending on the capital gains results and its effect on government revenue.



from the forging roll . . .

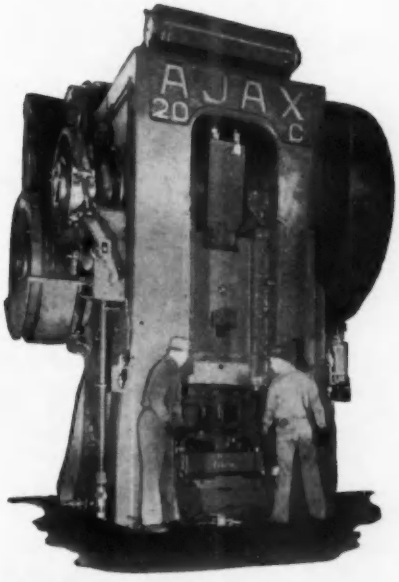
AJAX WIDE ADJUSTMENT FORGING ROLLS

PRE-ROLL YOUR FORGING BLANKS . . .

FOR METAL SAVING • LONGER DIE LIFE • BETTER FIBRE FLOW

AJAX ROLLS are built in seven sizes to pre-roll forging blanks ranging from Connecting Rod blanks to the largest Airplane Propellers. Illustrations show Automobile Connecting Rod blank formed (above) and press-forged (below) on **AJAX HIGH SPEED FORGING PRESS.**

. . . to the forging press



WRITE FOR BULLETIN 91-B

THE **Ajax** MANUFACTURING COMPANY
EUCLID BRANCH P. O. CLEVELAND 17, OHIO
110 S. DEARBORN ST., CHICAGO 3, ILLINOIS
W. P. WOOLDRIDGE CO. • BURLINGAME, CAL. • LOS ANGELES 22, CAL

Gasket engineering

GASKET GAUGE vs. TORQUE RETENTION

Gasket thickness is one of several factors affecting retention of initial torque loads. New study indicates significance of minor variations in gauge.

E. M. SMOLEY
Research Physicist
Armstrong Research and Development Center

Relatively small changes in thickness can produce significant variations in the torque retention characteristics of a gasket. This is one of the conclusions of a general study of the torque retention problem made at the Armstrong Research and Development Center.

Generally, this work confirmed the widely accepted idea that for maximum torque retention it is desirable to use the thinnest gasket possible. But the magnitude of variation produced by changes in gauge was greater than previously estimated.

One phase of the study is charted above. In this curve, torque is plotted along the vertical scale, and uncompressed gasket thickness is indicated along the horizontal scale. The initial bolt torque was 20 pound feet for each of the materials tested.

After 18 hours at 300° F., the thinnest gasket (1/64″) showed an exceptionally low torque loss of only ½ of 1%.

Increasing the thickness to 1/32″, the loss rose to 39%. The loss for 1/16″ material was 68.5% of the initial torque load.

It is estimated that bolts at least 5″ long would be required to wipe out most of the torque loss on the 1/10″ material. Actually, 1″ bolts were used in all these determinations.

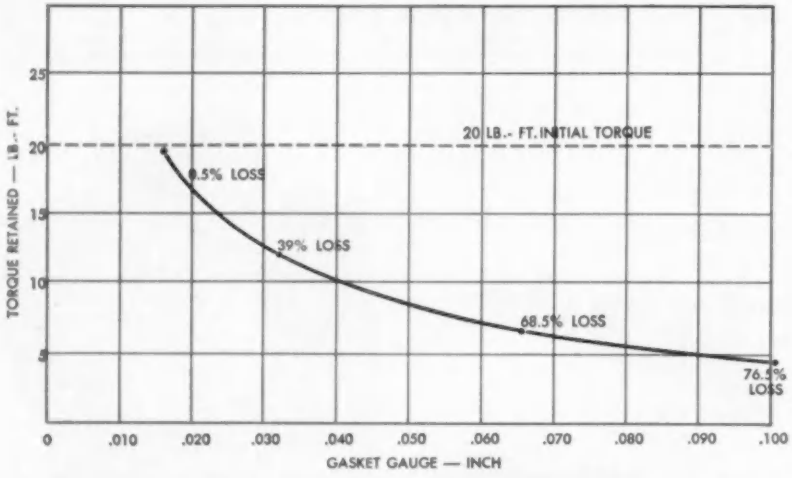
Aside from mechanical advantages, another reason for using thin gaskets is, of course, that they cost less. And they also minimize extrusion, particularly with straight rubber gaskets.

Armstrong engineers point out that there are factors that limit gauge reduction beyond a certain point. One is that to provide a seal, gaskets must be compressed more than the cumulative deviation from perfect parallelism of the two flange surfaces.

For example, take a 1/32″ gasket cut from a material normally capable of a 50% compression. If used where the cumulative inaccuracies of the flanges are more than 1/64″, leaks will result. The alternatives are to use a thicker gasket or a more compressible material.

Joint designs that permit bowing between flange bolts also work against the use of thin gauges. The same alternatives may provide a solution in such cases.

Gasket thickness is only one of many factors in gasket engineering that are under study continuously at the Armstrong Research and Development Center. Much detailed information on this work is contained in the Armstrong Gasket Design Manual. Write for your copy today. Address Armstrong Cork Company, Industrial Division, 7107 Imperial Avenue, Lancaster, Pennsylvania.



In this test, four gauges of one beater-saturated asbestos fiber gasket material were put in steel flanges, with bolts torqued to 20 pound feet. The assemblies were heated at 300° F. for 18 hours; retained torque was measured while flanges were hot.

IMPERIAL
Engineering and Data File

DURA-TITE TABLE OF COMPARISON

Features	TYPE OF PORT SEAL		
	Pipe Thread	"O" Ring	Dura-Tite
Permits angular positioning of fitting with no possibility of leaking	no	yes	yes
Suitable for use with all hydraulic fluids without changing components	yes	no	yes
Safety from seepage up to 20,000 psi	no	no	yes
Can be reconnected repeatedly without changing sealing element	no	no	yes
Withstands high pressures to temperatures of 300° F	no	no	yes
Simple to install — no loose parts	yes	no	yes
Usable with SAE standard straight thread boss	no	yes	yes
Unlimited shelf life	yes	no	yes
No deterioration of sealing element due to aging	yes	no	yes
No possibility of damaging sealing element in assembly	yes	no	yes

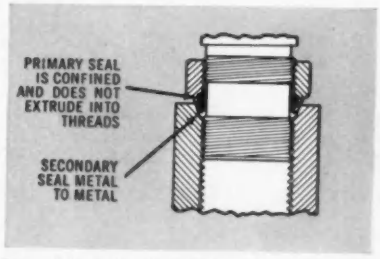
HOLDS PRESSURES TO 20,000 PSI...

NEW DURA-TITE IS INDUSTRY'S MOST FOOLPROOF PORT SEAL FOR TUBE FITTINGS!

From Imperial research comes a new, more effective and far more simplified port sealing method for tube fittings. As you can see on the chart pictured above, Dura-Tite does everything an "O" ring fitting will do—*and much more*—without requiring any special skill or care.

Even at pressures up to 20,000 psi, Dura-Tite provides a positively seepproof seal, and the fitting can be positioned in any direction without impairing tightness. And, because Dura-Tite's polyamide split ring seal is confined, it cannot distort or extrude into threads. The joint can be opened and remade at least 25 times without seepage.

Note how Dura-Tite creates a *double seal* with a single, simple operation. The fitting comes complete, with no additional parts to be added in the field. It uses any standard SAE straight-thread port. No special machining is required.



The special polyamide sealing medium contained in Dura-Tite will outperform any "O" ring compound. It has no hydraulic fluid limitations, being highly resistant to most chemicals. Solves temperature problems, too. Tests have shown that the Dura-Tite seal will withstand high pressures at temperatures up to 300° F. There is no need for periodic replacement because of deterioration on the job.

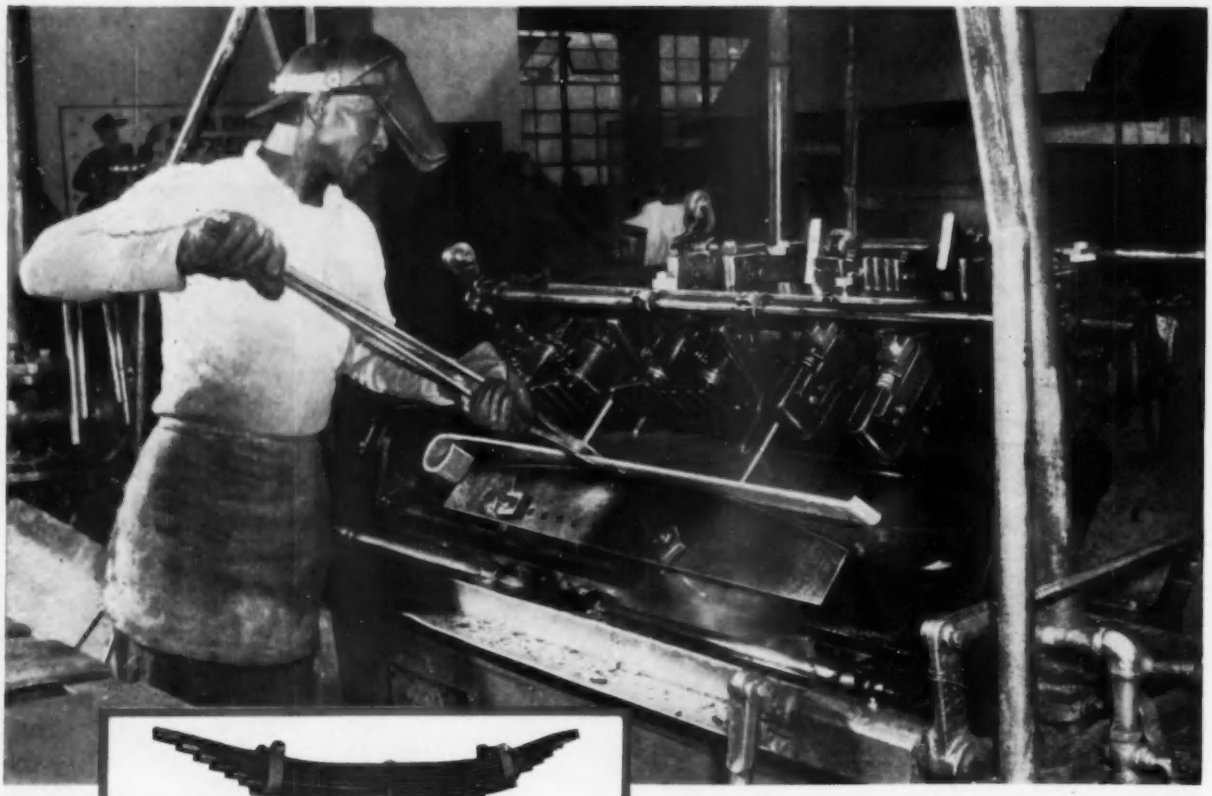
Dura-Tite port seals can be obtained in both Imperial Hi-Seal flareless and 37° flared tube fittings in steel and stainless steel. And, Dura-Tite costs no more than "O" ring seals but makes important savings in installation.

IT'S IN THE BOOK

Dura-Tite port seals are covered in Imperial's new Hi-Seal catalog No. 3108 and in Bulletin EPR-2. Send for copies today.

THE IMPERIAL BRASS MANUFACTURING CO.
Dept. AI-70, 6300 West Howard Street
Chicago 48, Illinois

Circle 152 on Inquiry Card for more data



A SPRING LEAF TAKES SHAPE

SHAPING spring leaves in modern rotary presses is one of the basic operations in the manufacture of Burton leaf springs.

As they emerge from the heating furnace, bars are placed in the forming die to give the proper "arch" to the spring leaf. This important operation must be done under careful supervision to insure dependable spring performance and exact conformity to the engineer's design. Here, as in every step of manufacturing, Burton Springs receive utmost care.

This is partly why most prominent builders of auto trucks and off highway equipment use Burton Springs. They have come to recognize quite clearly that *"Only Burton Can Produce Burton Quality."*

BURTON SPRINGS

VITAL SUPPORT FOR THE AUTOMOTIVE INDUSTRY

BURTON AUTO SPRING CORPORATION • WESTERN AVENUE AT FORTY-EIGHTH STREET • CHICAGO 32, ILLINOIS

Compact 4-way

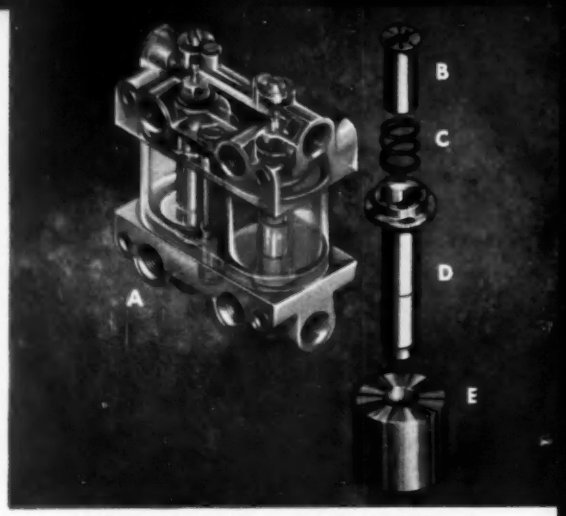
SKINNER

Solenoid Valves

assure precise cylinder control

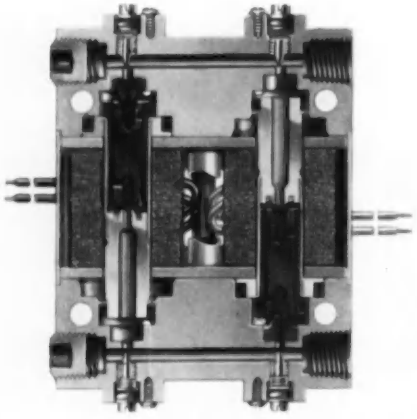
Here's how accurate, dependable operation is built into SKINNER 4-way solenoid valves

- **Precise flow control**—by adjustable metering
- **Compact, direct acting**—two 3-way valves in one housing
- **Durable and corrosion resistant**—stainless steel internal parts
- **Leakproof, bubbletight sealing**—soft, synthetic inserts
- **Positive operation mounted in any position**—spring-loaded plungers
- **Underwriters approved**—wide selection of coils, voltages and frequencies
- **Wired from front or rear**—housing easily reversed
- **Adaptable to many uses**—optional porting arrangements



A. Transparent view of 4-way solenoid valve B. Plunger
C. Plunger return spring D. Sleeve E. Coil

SKINNER four-way solenoid valves available in three basic types



The Skinner V9 solenoid valve is two 3-way valves in one compact housing. Both valves may be independently controlled and metered to provide accurate, dependable control of single- or double-acting cylinders, or larger pilot-operated valves.

V9 types are available without adjustable flow and with metering at both exhaust ports, both inlet ports or full metering of all ports.

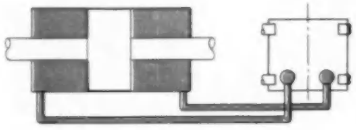
• • •

For complete information, contact a Skinner Distributor listed in the Yellow Pages or write us at the address below.

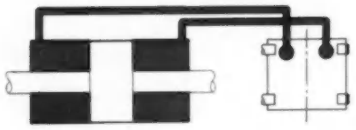
V9 SERIES SPECIFICATIONS

Media—air, hydraulic oils, inert gases
Orifice Diameter—$\frac{3}{64}$", $\frac{1}{16}$", $\frac{3}{32}$", $\frac{1}{8}$"
Pipe Size—$\frac{1}{4}$" NPTF
Maximum Operating Pressure Differential—0 to 150 PSI (up to 225 PSI also available)
Temperature Range—minus 40°F. to plus 180°F.
C_v Factor—$\frac{3}{64}$" .052, $\frac{1}{16}$" .095, $\frac{3}{32}$" .156, $\frac{1}{8}$" .214
Mounting—$\frac{1}{4}$" through-bolt holes.

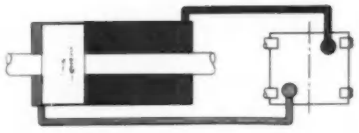
Normally closed—normally closed V933 valves with a neutral position. Generally applied on double-acting cylinders where the piston is in a neutral position without pressure when both coils are de-energized. This permits manual shifting of the piston without operating the valve.



Normally open—normally open V955 valves with a neutral position. Generally applied on double-acting cylinders where both sides of the piston are to be open to pressure when both coils are de-energized. Under certain conditions, the first operating stroke of double-acting cylinders will be smoother with this valve in use.



Normally closed—normally open V935 valves with no neutral position. Generally applied on double-acting cylinders where the piston is to be in retracted or extended position with pressure when both coils are de-energized. Wiring is simple—both coils are operated simultaneously and can be controlled by one single-pole, single-throw switch.



When you specify solenoid valves, specify Skinner. Skinner solenoid valves are distributed nationally.

SKINNER ELECTRIC VALVES

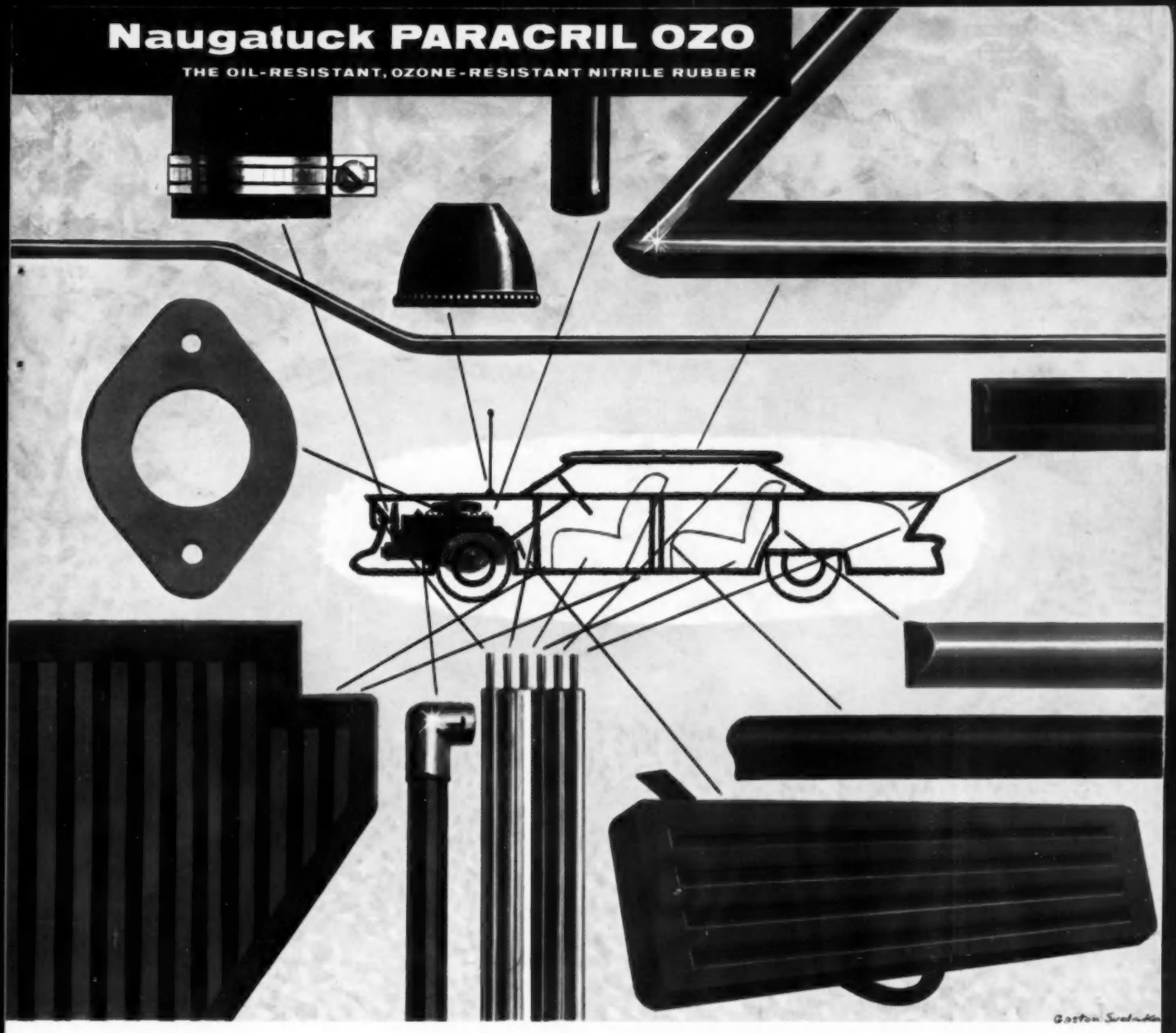
THE CREST OF QUALITY

SKINNER ELECTRIC VALVE DIVISION,
THE SKINNER CHUCK COMPANY • NEW BRITAIN, CONNECTICUT, U.S.A.

PRINTED IN U.S.A.

Naugatuck PARACRIL OZO

THE OIL-RESISTANT, OZONE-RESISTANT NITRILE RUBBER



Great new advance in automotive rubber

Here is a new rubber that's unmatched for oil, weather, and abrasion resistance. It's new PARACRIL® OZO, the finest achievement yet in the nitrile rubber field. PARACRIL OZO's properties are tailor made for many modern automotive parts—for everything from weather stripping to oil seals and hose. PARACRIL OZO gives you a whole series of important advantages, including:

- significantly superior ozone resistance
- excellent fuel and oil resistance
- several times greater abrasion resistance
- permanent retention of bright colors for exterior styling and easily traceable wiring and other interior parts

Look into PARACRIL OZO. Discover for yourself its new design possibilities...its unlimited color...its high quality. Contact your nearest Naugatuck representative at the address below.

Naugatuck Chemical

Division of United States Rubber Company

Dept. A Elm Street
Naugatuck, Connecticut

US RUBBER

Rubber Chemicals · Synthetic Rubber · Plastics · Agricultural Chemicals · Reclaimed Rubber · Latices · CANADA: Naugatuck Chemicals Division, Dominion Rubber Co., Ltd., Elmira, Ontario · CABLE: Rubexport, N.Y.

"Wood Be" torsion suspension by Mather about 475 B. C.

LET MATHER SOLVE YOUR SUSPENSION PROBLEMS, TOO

Confucius's contemporary contraption really isn't confusing. It will work . . . its design is based on the proven principles of torsion suspension engineered by Mather.

We have the experienced manpower, the research, design and manufacturing facilities to help you with your specific suspension needs.

Why not put our 50 years of experience to work. We'll welcome the chance.

MATHER

THE MATHER SPRING COMPANY

TOLEDO, OHIO

← Circle 155 on Inquiry Card for more data

Circle 156 on Inquiry Card for more data

Manufacturers' News

B-W Acquires Elgin Metalformers

The Ingersoll Products Div. of Borg-Warner Corp. has acquired Elgin Metalformers Corp. of Elgin, Ill. Elgin is a leading supplier of metal modular-type enclosures to the electronics and communications industries. Donald Jones, associated with the Ingersoll Div., has been appointed general manager of the new subsidiary.

Tidewater to Spend $100 Million

More than half the $100 million capital expenditures this year will go for exploration and production, George F. Getty II, president, has told stockholders. Manufacturing and marketing will each receive about 17 per cent and transportation will be responsible for 10 per cent. Mr. Getty said continued close control of inventories and an ability to hold the line on operating costs should assure improved earnings by Tidewater Oil Co.

American ENKA Changes

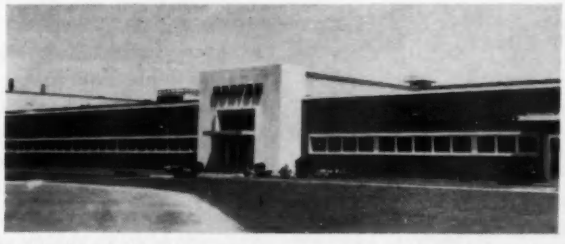
American ENKA Corp.'s Marketing Div.'s headquarters are now in the company's new office building in Enka, N. C. In addition, the ENKA Merchandising Dept. and New York district sales office has moved to 350 5th Ave., New York City.

Herington Gets Foundry Post

G. E. Herington, president of a New Rochelle, N. Y., advertising firm, has been appointed secretary-treasurer of the Foundry Facings Manufacturers Association. Mr. Herington also acts as executive secretary for the Metal Treating Institute and the Ultrasonic Manufacturers Association.

Armour Foam Plant Opens

Manufacture and fabrication of flexible polyurethane foam—a cushioning material widely used for automobile seats and padding—is under way at a new Los Angeles plant of Armour Alliance Industries, a division of Armour & Co. The new facility has a capacity of 9000 lb of foam an hour. The plant is fabricating the material in a wide range of shapes and sizes for furniture, automobiles, aircraft and bedding, and industrial packaging.



Highlight of the 75th anniversary celebration of the Norton Co., Worcester, Mass., was completion of this $6.5 million plant. It provides added facilities for the manufacture or organic bonded grinding wheels.

GMC V-6 and V-12 Production

(*Continued from page* 66)

1.8-gm. Incidentally, piston pin bore is held to a total tolerance of 0.0002 in., although the operation is aimed at maintaning a tolerance of 0.0001 in.

Following this pistons are transported into a washing machine to clean and cool; then into the temperature-controlled inspection booth for final inspection and grading. Sheffield air gaging is employed for grading and piston pin size. In addition, the operator checks skirt taper, alignment of piston pin hole, checks ring grooves, retainer grooves, contour of depression in the dome, and rechecks for standard weight. An Arlin electronic gage is used for checking surface finish.

Another interesting area — engine assembly, testing, and storage—is covered briefly in this article. Engine assembly is facilitated by making up sub-assemblies wherever this is feasible so as to reduce work on the assembly line. Largest of these is the initial assembly of the cylinder block and flywheel housing. This is done on a separate line, leading directly to the final assembly line. The sub-assembly line is split into two sections—large volume and small volume. One line carries the sub-assembly to a large two-spindle Baker boring machine; the other has one Sundstrand boring machine. In each instance, the flywheel end is bored in line with the crank bore of the block, and is faced.

The final assembly line is of pedestal type on a power conveyor, the attachment fixture on the pedestal being of universal adjustment type to permit operators to turn the assembly in any aspect that facilitates the operation at that station. One of the distinctive features of the line is a maximum use of air tools of all kinds. Among these are a number of large multiple-nut runners. For example, at the start of the line a 10-spindle Cleveland-Pneumatic nut runner is employed for disassembling the main bearing cap fastenings; a similar unit is used later to fasten the caps after the crankshaft has been installed. A larger, 24-spindle nut runner is supplied for making up oilpan fastenings in a single cycle.

Starting with the end of the final assembly line is a complex power-and-free conveyor system developed and installed by Mechanical Handling Systems. As engines reach the last station on the assembly line, they are engaged by an elevator fitted with one carrier. The carrier hooks onto an eye attachment on the engine, then is elevated to the level of the power-and-free conveyor for transport to the hot test area, immediately adjacent to the assembly line.

Most of our readers are familiar with the general details of operation of such power-and-free systems. In this instance, the system about the hot test serves to store engines until they can be delivered to an open test stand. If there is no free stand the engines continue

"Spring" stays in wheel covers made from Armco Stainless Steel, no matter how often they are put on and taken off. No need to reinforce, either. As formed, they stay strong and rigid.

Impacts that easily damage softer metals won't put stainless out of

Armco Stainless Keeps Its Spring, Helps Keep Dents Out of Wheel Covers

shape. With no chemical surface preparation, wheel covers of Armco Stainless Steel withstand effects of rain, snow, and street chemicals. They are not affected by detergents and white wall cleaners commonly used at home and in car-wash stations.

Lifetime service by millions of stainless wheel covers and hub caps is an excellent example of the contribution of stainless steels to balanced automotive design. Write for detailed information about Armco Stainless Steels. Armco Steel Corporation, 2130 Curtis Street, Middletown, Ohio.

Car owners respect stainless steel. Show them where you use it with STEELMARK labels and tags.

Stainless Steel

ARMCO STEEL

ARMCO

Armco Division • Sheffield Division • The National Supply Company • Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Union Wire Rope Corporation

to circulate about the storage line. When there is an open stand, an engine will switch to the track over the test stand. As is customary, the engine remains on its original carrier right up to the point of storage, the only exception being in the case of engines requiring major repairs.

The hot test, with engines running under power but without load, has a cycle ranging from 20 to 25 minutes, depending upon the length of time it takes to attain a standard temperature. The carrier has a control "flag" with three positions, any one of which is selected by the operator as the test is completed. A fully accepted engine is set for delivery to the paint booths, then to the storage bank; an engine requiring repair is routed to the repair area. All engines routed to repair, whether minor or major, then are returned to the hot stand for another cycle of running for acceptance.

Accepted engines are stored in banks, then are drawn out, according to the truck assembly line schedule and delivered to the final dress-up line. When dress-up has been completed, the engines are attached to an overhead conveyor for transport to the vehicle final assembly.

After the carrier has delivered an engine to the storage bay it returns automatically to the starting point at the elevator via a special track. ■

Purchasing for Willys

(*Continued from page* 61)

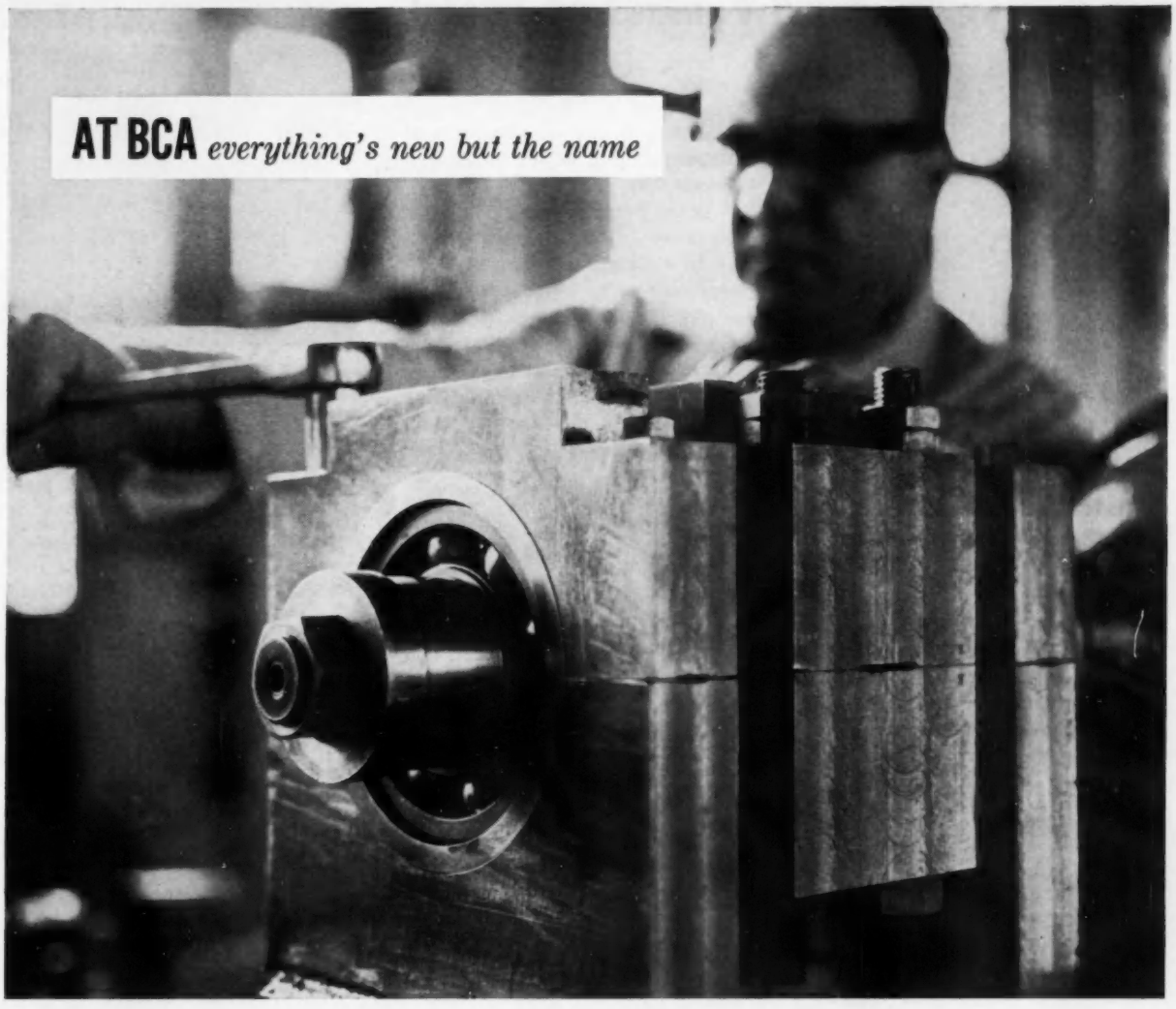
engineering personnel to establish specifications for parts and materials that guarantee adequate quality in the performance of the function for which the part or material is intended. In this respect, purchasing section heads are instructed to refer to the attention of the engineering department suggestions for achieving cost reductions by changes in materials or specifications.

The Willys Material Control Department also reports directly to the vice president of procurement, thus centralizing full responsibility for management of all material. The department has four major sections: Vendor Follow-up, Production Specifications, IBM & Scheduling, and Reclamation & Salvage. Each section is headed by a supervisor reporting to the department manager, who is in turn responsible to the procurement vice president.

Materials Control Functions

Material Control is responsible for maintaining an even flow of purchased material for manufacturing, service and export requirements, while achieving sound turnover ratios and avoiding excessive inventories. This is accomplished by developing detailed manufacturing and shipping schedules based on production forecasts, model changes, product improvement and other factors affecting usage.

Blanket purchase orders are issued by purchasing for production parts, materials for many recurring service parts, and certain non-production items. Against these blanket orders, the Material Control Department issues releases directly to the vendor to schedule material for shipment as required. ■



NEW "TORTURE CHAMBER" FOR RADIAL BEARINGS

duplicates military acceptance tests

This is a torture chamber for radial bearings. Here BCA ball bearings are run . . . hour after hour . . . under loads of 5000 pounds per bearing – matching military acceptance tests for radial bearings. This special BCA-built device is an important control and development tool. It provides essential data for BCA's ball bearing research program.

This tough performance test is an example of the greatly expanded research and testing facilities which BCA has developed for the benefit of bearings users. Reason: to provide the finest possible ball bearings to customers. Results: bearings which consistently exceed performance specifications on whatever kind of jobs they are designed for.

Among the extensive new facilities at the BCA laboratories is a Temperature-Humidity-Controlled Instrumentation Room containing precision instruments, many of which have been specially designed and modified for bearing research. There are a number of unusual testing devices, too; in design, identical to equipment in customers' plants. On these, BCA bearings can be tested *under the exact operating conditions specified by the customer.*

BCA provides a complete line of ball bearing sizes and types for nearly every kind of industry. They're standard original equipment on automotive, machine tool, earth moving, and agricultural equipment, for example. And, you'll find BCA a dependable source not only for high-performance ball bearings but engineering assistance, should you need it. For more information, contact Bearings Company of America, Division of Federal-Mogul-Bower Bearings, Inc., Lancaster, Pa.

BEARINGS COMPANY OF AMERICA

ball bearings

DIVISION OF
FEDERAL-MOGUL-BOWER
BEARINGS, INC.

Circle 161 on Inquiry Card for more data

Circle 112 on Inquiry Card, for more Data ⟶

Spray-Applied Vinyl Finishes on Metal

By F. L. Scott

Technical Manager

Coatings Div., Metal & Thermit Corp.
Carteret, N. J.

Pictured are typical textured-metal sample parts to which an M&T organosol-type vinyl decorative finish is being applied by spray gun. Included are automobile dashboard specimens and interior trim items. Also being coated is an experimental TV cabinet, fabricated of smooth metal, which will receive a special multi-color sprayed organosol finish to simulate pigskin.

SPRAY-APPLIED vinyl dispersion coatings—plastisols and organosols — have advantages and economies that guarantee rapid acceptance and use in the product finishing field.

Plastisols and Organosols

To keep the terminology straight, plastisols and organosols are liquid materials in which the principal resin is dispersed, but not dissolved, in a liquid carrier. Actually, any resin is theoretically capable of being dispersed to form a so-called organosol or plastisol. However, today, because of their peculiar solubilities and compatibilities, vinyl resins almost entirely are the basis of plastisols and organosols.

A *plastisol* consists essentially of vinyl resin dispersed in a non-volatile liquid—plasticizer or blend of plasticizers. An *organosol* consists of vinyl resins dispersed in a mixture of non-volatile and volatile liquids—plasticizers and volatile diluents. Other ingredients, such as stabilizers (for protection against changes due to heat and light), pigments (or color), and modifiers (for specific end-use properties), may be added to either plastisols or organosols.

The reaction occurring, which forms a tough, continuous vinyl film, is purely a physical one—namely a dissolving of the vinyl resins in the non-volatile liquid carrier through the application of heat, generally between 350 and 420 F.

Comparisons of Plastisols and Organosols

The two types of vinyl dispersions differ in several respects. The newer organosols form a harder coating than plastisols. However, because of the presence of volatiles, maximum thickness applied in a single spray application is usually limited to from 6 to 15 mils. Plastisols form a more resilient, rubber-like coating, and can be sprayed to greater single-coat thickness. Using a plastisol dip, it is possible to apply up to ½ in. of vinyl to a metal surface under the right conditions.

Both have many advantages in common as members of the same chemical family. These include toughness, abrasion - resistance, chemical and corrosion resistance, and ease of application. But each has its own distinct area of use.

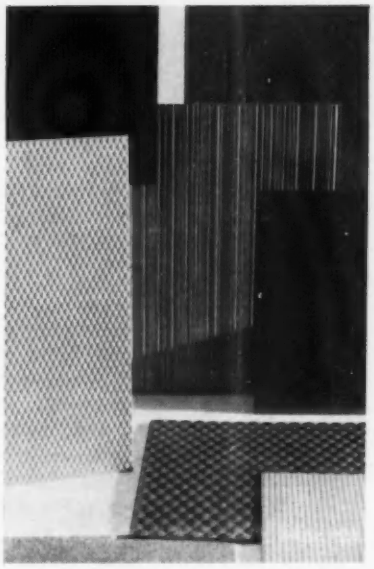
Plastisols will continue to see expanding application where thicker, more-resilient and cut-resistant qualities are desired—such as dishwasher tank linings. Their freedom from volatiles minimizes the hazard of flammability. Plastisols are ideally suited, of course, for rack coatings, tank linings, and scores of other heavy-duty industrial jobs.

Organosols will see increasing use in areas where their tougher and harder surface is desired, and especially where it is important to reproduce faithfully the texture of the underlying metal. They provide easier handling with conventional spray equipment because of their lower viscosity. They also offer greater pigmentation possibilities and a greater range of modifiers. Film flexibility may be varied over quite a range with organosols.

Organosols in Production

Organosols, which can be applied in the same manner as conventional paints, lend themselves well to spray or electrostatic techniques. Because of their thixotropic properties, the organosol material remains in place and does not sag or run. It is this property that gives faithful reproduction of underlying metal.

M&T organosols are being used presently by the automobile industry for production parts. They are being explored actively by a number of other fabricators. (*Cont.*)



M&T Unichrome vinyl organosols—when spray-applied to textured metals, either steel or aluminum—duplicate the patterns in the metal backings and give finishes like the ones shown.

Costs

Vinyl laminates, produced on a production basis where 12-mil vinyl sheet is applied continuously to flat metal strip, cost an estimated 17¢ per square foot.

Precoating steel strip with the same thickness plastisol costs approximately 10¢ per square foot. Neither of these figures includes cost of the steel.

An average figure for a 5-mil coat of spray-applied organosol on a one-square-foot panel in volume production is 14¢. For 12 mils of spray-applied plastisol, and on the same volume production basis, cost is estimated at around 12¢.

The following figures for metal costs were furnished by a major supplier of plain and textured steel:

	Per Sq Ft
Steel, 0.041-in., 20,000-lb lots	16.6¢
Textured Steel, 0.041-in., 20,000-lb lots	19.6¢
Steel, 0.041-in., 12-mil vinyl laminate	32.9¢

One major appliance manufacturer pays 28¢ per square foot for 0.0239-in. steel with 12 mils of laminated vinyl, and 32¢ for the same thickness of vinyl on 0.0359-in. metal.

From the cost standpoint, the various methods of obtaining a vinyl finish are reasonably competitive. This excludes consideration of fabrication and production economies. ■

Major Features of New Sprayed-On Organosol Vinyl Finishes

Can be Applied:
- After fabrication of parts;
- To steel or aluminum—plain or textured;
- With conventional spraying equipment;
- To vertical and complex-shaped parts without sagging.

Coating:
- Is hard and abrasion-resistant;
- Thicknesses are up to 12 mils;
- Duplicates embossed patterns in base metals.

Processing:
- Clean and phosphate metal;
- Apply special primer;
- Spray vinyl organosol dispersion;
- Bake at 350 to 420 F.

Potential Automotive Applications:
- Moldings
- Armrests
- Window Frames
- Kick Plates
- Package Trays
- Seat Backs
- Heater and Air Conditioner Housings
- Interior Panels
- Quarter Panels
- Flooring and Decks

Ford Defense Operation

Ford Motor Co. has set up a special military vehicles operation as part of the Defense Products Group. The new operation takes in the Special Military Vehicles Office, Defense Contract Administration, Mobilization Planning and Defense Sales departments.

Frank S. Kipp, formerly manager of Defense Contract Administration, has been appointed general operations manager of the new section.

Machining Aluminum Pistons on Automatic Lathes

CUMMINS Engine Co. of Columbus, Ind., recently set up a machining line for pistons to be used in the Cummins line of Diesel engines.

These pistons are fabricated of aluminum and arrive in the Columbus plant rough turned and faced on top. The nature of the machining operations to be performed permits the choice of multi-spindle equipment or fairly simple but versatile single spindle machine tools. Cummins engineers chose the latter by utilizing three LoSwing lathes and a knurling machine manufactured by the Seneca Falls Machine Co. Tooling supplied with the lathes was specially designed for quick change-over from one type and size piston to another. Integral quick change-over features of the lathes themselves permit variation in carriage stroke, rapid traverse and feed cycle without changing cams on the piston line.

The first operation is performed on a Seneca Falls LN-18 lathe. Pistons are then manually removed to a Model LR lathe. After the second operation is completed, the pistons are removed to another lathe situated directly behind this one; and the final operation is performed on a knurling machine.

The operation which is performed on the LN-18 consists of boring, facing, turning and chamfering the open end of the piston, and simultaneously, centering the boss on the closed—or "dome" end. The rough piston is held in a special three jaw pneumatic chuck. The jaws of this chuck are set at an angle to position the piston against the three point end locator. The jaw opening and closing mechanism is operated by a hollow-spindle, revolving, pneumatic cylinder mounted on the end of the headstock spindle. Tooling for machining the open end of the piston is mounted on the cross slide which is in turn bolted to the platen. Longitudinal movement of the platen is controlled by a cam located in the base of the bed. The cross feed to the slide also is cam operated.

The centering operation on the dome end of the piston is of particular interest in that it eliminates a separate operation by center drilling the pistons while they are being bored, faced, turned and chamfered. Exact alignment of center drill and skirt boring is thus assured because the operations are accomplished in the same chucking.

The center drilling operation is accomplished by a cam-driven, spring-loaded drilling spindle operation in timed relation to the main camshaft of the lathe. The center drilling spindle does not rotate with the chuck and work piece. Feeding movement is derived from the main camshaft which in turn drives an auxiliary camshaft and cam. Rotation of the auxiliary camshaft is translated into linear motion by using a cam roller in the feed cam groove. The cam roller is keyed into the drilling spindle. As the feed cam turns, the roller forces the drilling spindle forward thus drilling a centering hole in the piston dome. The drilling spindle is

(*Turn to Page* 134, *please*)

MACHINERY NEWS

(*Continued from page* 82)

tion at the Exposition. Since there will be no advance registration, this "Rapid Registration Card" should *not* be mailed in—but rather *brought* to the Exposition filled-in by the individual. For those requesting an Inquiry Timesaver Plate, a registration card will be forwarded with the plate. If a plate is not desired, the registration form can be obtained from the sources mentioned above.

Perhaps the above may help clarify some of the misunderstanding which has been reported to exist.

Heald Expands Facilities with Large Backlog

Facilities for the assembly and testing of numerically-controlled machine tools have been expanded at the Worcester plant of The Heald Machine Co., according to an announcement by Hartwell G. Howe, vice-president and general manager.

"With our backlog for these machines largest in history, the new and expanding field of numerically-controlled machines makes necessary additional floor space for building and testing these complicated units," Mr. Howe said, adding, "Numerical control is employed on Heald Bore-Matics, precision grinders and new products under development."

A special air-conditioned and humidity-controlled enclosed area of 2400 sq ft has been built for precision assembly and run-off testing of the machines. A constant temperature of 70 deg is provided by the system.

The new section supplements Heald's facilities for manufacturing numerical control and special-purpose "classified" machines. Removable walls facilitate transfer of machines to and from the area.

Around the Industry

Onsrud Machine Works, Inc.—has purchased the Hydraulic Press Div. of Berthelsen Engineering Works, Inc., Joliet, Ill. The acquired product line includes heated-platen single and multi-

opening presses for laminating plywood, reconstituted board products, metal, plastics and rubber.

H. R. Krueger & Co.—this Detroit firm, formerly named the Krueger-Barnes Corp., has announced the availability of modernized and expanded facilities for producing larger specialized machine tools and equipment, including high - production automated machines. F. T. Ellis, Jr., is newly-elected sales vice-president.

Michigan Tool Co.—has set up a new Enterprise Div. which will provide facilities for production of high-quality spur, helical and bevel gears and splines for use in prototypes and in development quantities. The new division was formed by combining previous facilities with those of Gear Grinding Machine Co. and Enterprise Gear and Tool Corp., recently acquired.

Ex-Cell-O Corp.—has purchased the sine plate business of the Omer E. Robbins Co., and production will be handled at Ex-Cell-O's Greenville, O., plant. R. P. Scholl, sales manager of Bryant Gage products, will be in charge of Magna-Sine sales.

Heald Machine Co.—Lawrence H. Cousineau has been elected president, succeeding C. F. Roby who recently retired. Hartwell G. Howe has been appointed vice-president and general manager, succeeding Carl M. Beach. Mr. Beach is relinquishing his duties for health reasons, and will return to Cincinnati Milling Machine Co., the parent company. Glenn C. Moore assumes Mr. Howe's prior duties in the new capacity of domestic sales manager. Charles H. Munsey has been named export sales manager, succeeding Mr. Moore in that position.

E. W. Bliss Co.—A. S. Burgoyne, former vice-president of manufacturing, has been appointed vice-president and manager of the company's Press and Die Supply Div. Einar W. Sundberg has been newly named treasurer.

Cincinnati Milling Machine Co.—Philip O. Geier, Jr., has been elected vice-president and appointed assistant general manager.

National Automatic Tool Co., Inc.—Calvin Irish, formerly assistant chief engineer of Ex-Cell-O Corp.'s Machinery Div., has been appointed manager of product engineering at Natco. He succeeds LeGrande Terry, who is retiring after 35 years of service with Natco.

Burg Tool Mfg. Co. — Roland Hecker has been named chief engineer.

Douglas Tool Co.—Steve Herzina has been named sales manager.

Gisholt Machine Co. — Werner I. Senger has been named vice-president in charge of engineering on all company products except those of the Plastics Div. George M. Class, vice-president and director, will now devote his efforts to increased customer relations, patent administration, and special projects, as well as serve in a general advisory capacity. Ralph J. Miller, Jr., has been made district manager of the Chicago territory, following the retirement of Howard V. Myers. ■

ASTM Annual Meeting

(*Continued from page* 69)

tigue was made by H. C. Schjelderup, National Engineering Science Co., in a paper "Prediction of Acoustic Fatigue Life." The uniqueness of the problem is that spectrum-type loading is being duplicated at a rapid rate by a natural physical process. He concludes that fatigue-life prediction must include consideration of both load spectrum and cumulative damage. In his view if more reliable predictions are to be made, it will be necessary to accumulate a mass of random-type fatigue curves from experimental data. The familiar load spectrum tests then should be run in conjunction to show correlation between testing techniques.

Frankel, Bennett, and Carman of the National Bureau of Standards reported on the fatigue properties of a group of 18 high-strength low-alloy steels having usable tensile strengths in excess of 200,000 psi. They report the following conclusions:

1. For steels with less than 0.4 per cent silicon, the maximum fatigue strength was generally obtained for the lowest tempering temperature used, either 350 or 400 F. The fatigue strength of high-silicon steels remained approximately constant for tempering temperatures up to 600F.

2. All of the steels containing 1.3 per cent copper showed higher maximum fatigue strengths than any of the other steels, when tempered at 400 F or lower.

3. For steels of similar alloys, there is a decrease in the fatigue strength-tensile strength ratio with increasing carbon content.

4. Subsurface nucleation of fatigue cracks were prevalent in the steels with the best fatigue properties.

5. The fatigue strength-yield strength ratio is greater for steels containing copper as a major constituent.

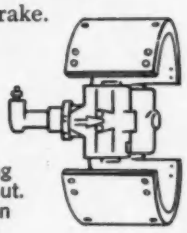
The effect of stress concentration on tensile strength of titanium and steel alloy sheets at various temperatures was investigated by George Sachs and John G. Sessler, Syracuse University Research Institute. Materials included a

(*Turn to page* 124, *please*)

ACTUAL TESTS PROVE:

NEW STOPMASTER BRAKE IS the most advanced brake design in 30 years!

Over three years of thorough and demanding road tests have proven the superiority of the new Rockwell-Standard Stopmaster Brake. Of its many new improvements the Stopmaster incorporates these major advantages to meet the modern trucking industry's demand for a more efficient, more dependable brake.

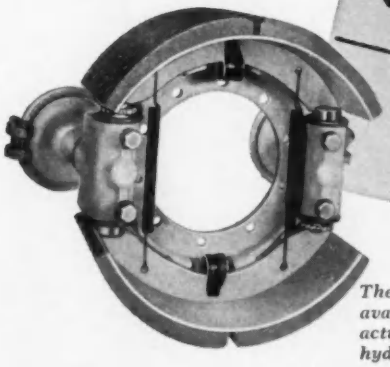


New Stopmaster actuation principal results in higher braking efficiency with less input. In dual actuation design both shoes do an equal amount of work over the entire lining surface. This balanced shoe action assures more dependable service; faster, surer stops; less maintenance.

New Stopmaster 15" diameter permits increased air circulation between brake drum and wheel rim. This results in cooler operating temperatures . . . less heat fade, longer lining life, longer drum life. Smaller diameter means less weight.

AVERAGE RESULTS OF NUMEROUS HIGHWAY VEHICLE TESTS PROVE:

- **35% lighter weight..** more payload capacity!
- **38% less heat fade..** safer, more continuous operation!
- **57% less air volume required..** permits smaller air reservoir tanks!
- **56% longer lining life..** lower operating cost, less maintenance!
- **56% longer drum life..** more dependability, less downtime!
- **66% less adjustment required..** greater safety, reduced maintenance!
- **37% less service parts** smaller inventories, less expensive!



The Stopmaster 15" Brake is available with either air or hydraulic actuation . . . also up to 30" diameter, with hydraulic actuation for heavy-duty, off-highway vehicles.

Another Product of...

ROCKWELL-STANDARD CORPORATION

Brake Division, Ashtabula, Ohio

ROCKWELL R STANDARD

Circle 169 on Inquiry Card for more data

Circle 170 on Inquiry Card for more data →

GOWN BY FON TAYNE; STAINLESS

from creative Crucible

Where a fine finish is only the beginning

The lustrous beauty and unsurpassed finish of Crucible stainless steel will enhance the sales appeal of any product. Crucible's experienced metallurgists can help you select the most suitable type, form and finish, and the most efficient technique for fabricating. Add to this the convenience of Crucible's nearby steel service centers (34 throughout the country) and you'll find Crucible an unbeatable combination — for superior steel . . . service . . . and supply.

CRUCIBLE

Stainless Steel

SHEET, STRIP, ROD AND WIRE BY CRUCIBLE STEEL COMPANY OF AMERICA PITTSBURGH 30, PA.

ASTM Annual Meeting

(*Continued from page* 120)

number of ultra-high-strength steels and heat treated titanium alloys at several test temperatures from minus 320 F to 800 F. Sheet specimens with edge-notches of various root radii were employed. Test results illustrate a wide variation in the behavior of different alloys as a function of temperature. Some steels approach an extremely brittle condition when exposed to very low temperatures. It was also found that the behavior of titanium sheet alloy, heat treated in non-conventional manner, appears to be in general conformity with present concepts of "ideally brittle" materials. The authors also found that the major factor influencing the degree of notch sensitivity of titanium and steel alloys is the actual tensile strength of the material.

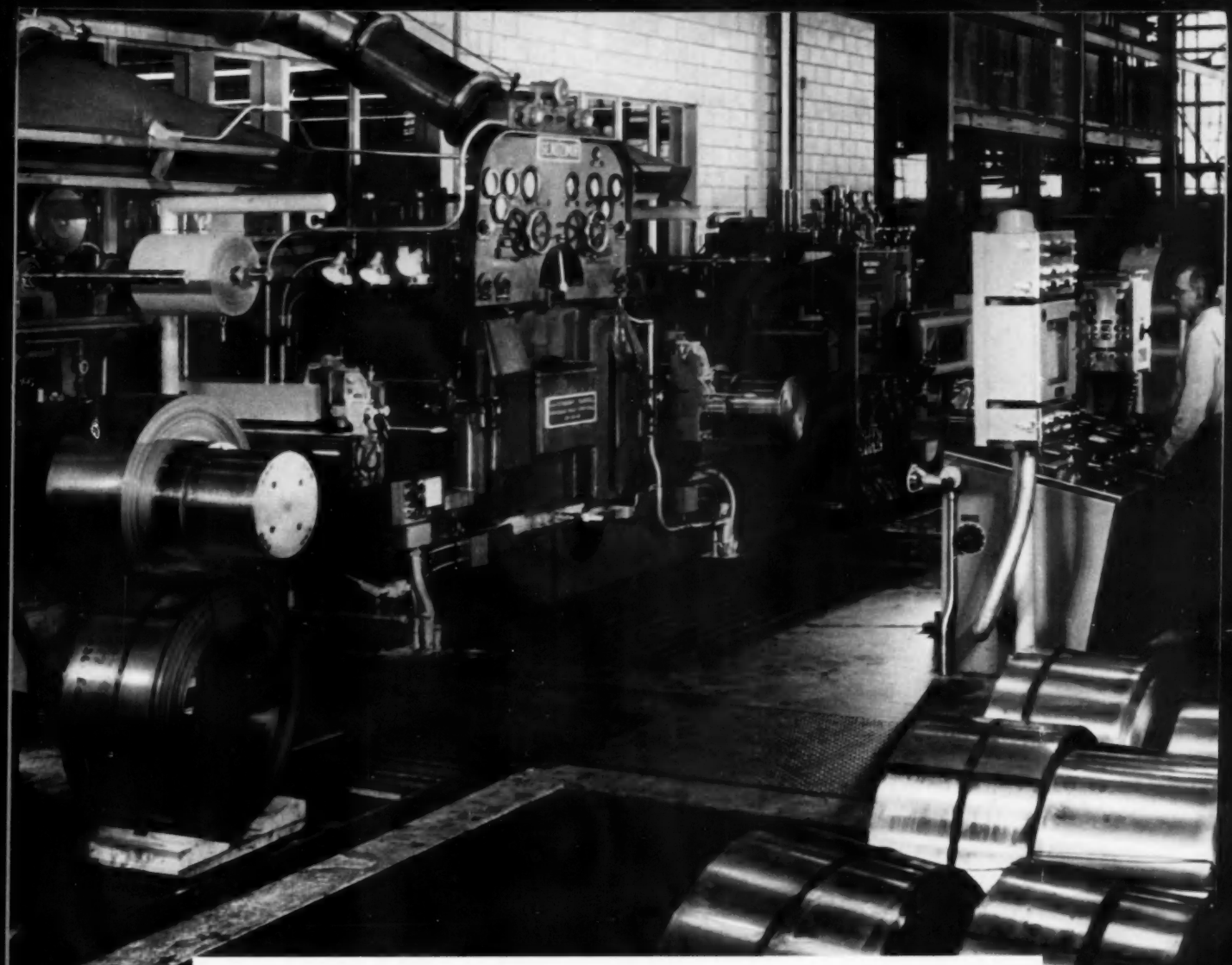
Shear testing of bonded metal-to-metal joints was reported by Lee R. Lunsford, General Dynamics Corp. The investigation stems from below-par results of early bonded titanium sandwich panels. Factors affecting joint strength, different specimen types, and the properties evaluated for each types are covered in detail. These properties are compared with the properties of a bonded joint which actually allows failure to occur. The author points out that most methods currently employed are empirical and subject to serious error if such information is extrapolated to other materials and environments. The possibilities of predicting joint strength from the basic material properties are discussed. The paper also discusses the difficulties encountered in bonding titanium joints where the adherent strain is approximately twice that of steel or aluminum.

The principles evolved in this study have been incorporated into an analysis in which the shear modulus of the adhesive becomes very important.

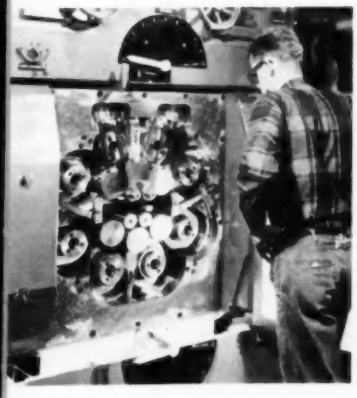
Features of design detail for improving the fatigue resistance of airplane structures were described by C. R. Smith, General Dynamics Corp. The objective was to seek methods that would prolong fatigue life in built up, riveted structures. Lessening the loading on the first row of rivets in joints, providing interference fits, or a combination of the two were found helpful. Test data were obtained showing that the ratios of effective spring constants of pressed-in bushings to those of surrounding structure can be used to predict fatigue life. Effects of static overloading prior to testing also are covered. The paper describes a method for determining the effect of interference fits. The author sees the need for more work in studying the fatigue losses with overloads, especially aimed at designing structures free from inducing overloads.

Utilization of Solar energy was the subject of the 1960 Marburg lecture by Dr. Farrington Daniels of the National Academy of Sciences. It was particularly appropriate in view of the recent launching of Pioneer V and other satellites employing solar energy. The speaker touched on new materials such as plastics for reflectors and covers for solar collectors; silicon cells; solid state devices; refrigerant systems; and selective coatings

(*Turn to page* 130, *please*)



Superior's new SENDZIMIR Mill



Close-up of the 18 back-up rolls providing tremendous power and rigidity to super-finished work rolls, for flawless precision strip production.

Fine-watch precision—
great power, rigidly controlled!

The ultimate in dimensional accuracy and finish is now available in Superior Strip Steel . . . in widths up to 24" . . . in larger and heavier coils . . . thanks to our new Sendzimir Mill with electronic continuous gage control. Strip is reduced to final gage at speeds reaching 1,000 feet per minute—every foot within required tolerances, beautifully finished for your most particular product requirements. Let us serve you with Superior Strip Steel *finer than the finest obtainable until now!* Write us about *your* requirements.

Superior
STRIP STEEL

SUPERIOR STEEL DIVISION
OF
COPPERWELD STEEL COMPANY
CARNEGIE, PENNSYLVANIA

For Export: Copperweld Steel International Company, New York

PARDON OUR NAME DROPPING...

but we're proud of the experience we've gained equipping them with Zenith® Carburetors!

You can benefit greatly from our experience as designers and builders of carburetors—more experience in different fields than any other carburetor manufacturer. Our experience with many different types of equipment, using both gasoline and L-P carburetion systems, ranges from massive motor trucks to small power units.

Our extensive experience in the farm equipment, automotive and marine fields can help with your applications. We'd welcome an opportunity to work with you on today's production or tomorrow's plans. Write to Zenith Carburetor Division, 696 Hart Avenue, Detroit 14, Michigan.

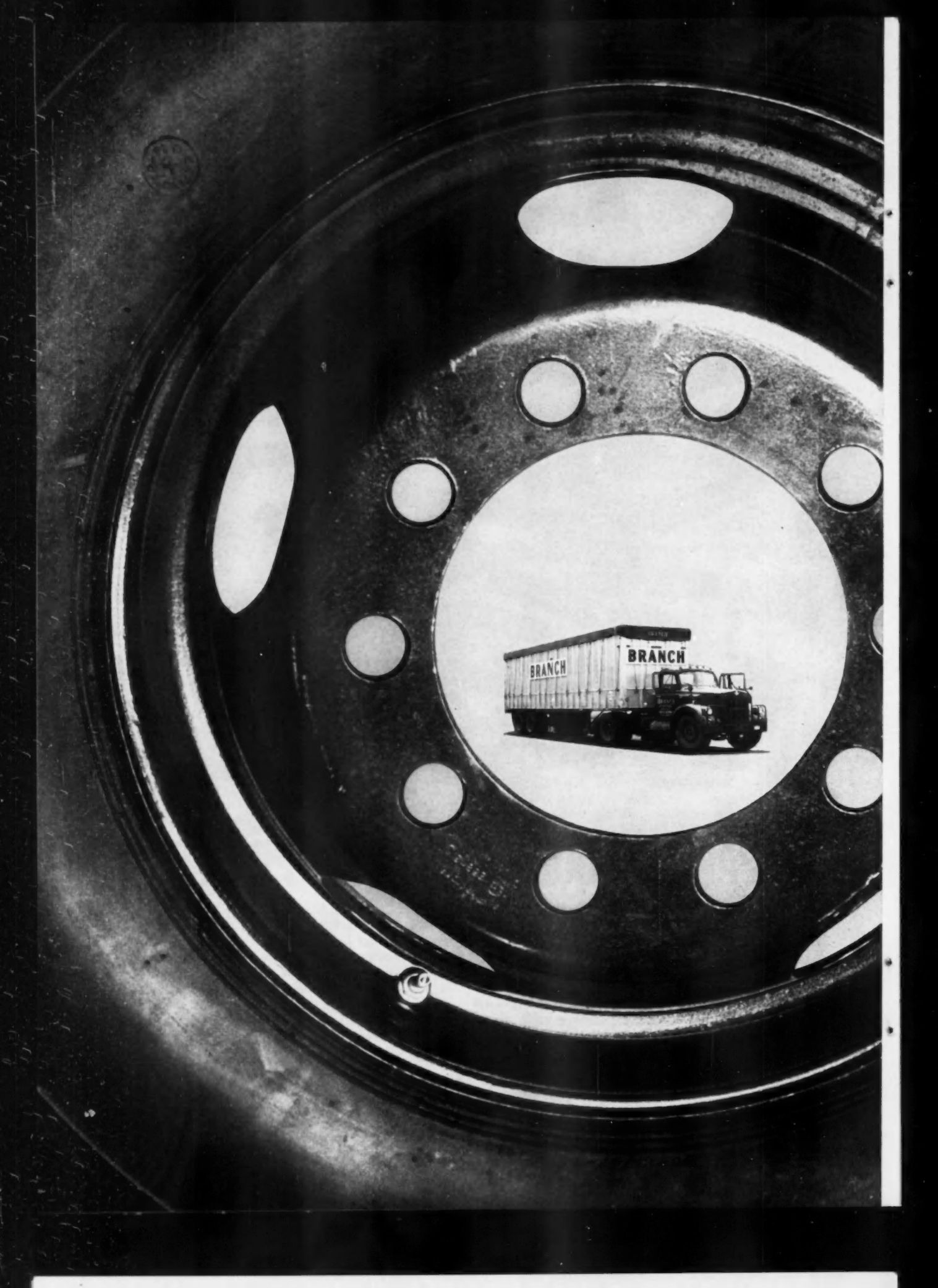
Zenith Carburetor Division

Detroit 14, Michigan

THE Bendix CORPORATION

Circle 174 on Inquiry Card for more data

Circle 175 on Inquiry Card for more data ⟶


BRANCH
BRANCH

This mark tells you a product is made of modern, dependable Steel.

Branch Motor Express reports:

"Only 12 steel disc wheels replaced in 10 million miles!"

Branch Motor Express, Brooklyn, N. Y., is a 100% steel disc wheel user. Branch's fleet of tractors, trailers and trucks average over 10 million miles annually. Last year, they had to buy only 12 replacement wheels for their entire fleet!

Says one Branch official: "We are sold on the economy and long life of steel disc wheels and specify them in original equipment. We average 60,000 miles per year per vehicle, and the use of steel wheels establishes operational uniformity because they are interchangeable with any other rig. We find that in the long run steel disc wheels cost less and are more durable."

Steel disc wheels keep saving money for you for many thousands of miles of dependable service. Tires last longer because steel wheels are round, don't run out. This gives a smoother ride, increases vehicle life, is easier on cargo, and cuts driver fatigue. Steel disc wheels are specially designed for today's high-speed, long-range operations. Always specify *steel* disc wheels for utmost safety, dependability and economy.

USS United States Steel

TRADEMARK

ASTM Annual Meeting

(*Continued from page* 124)

for high efficiency energy absorbers.

Although it received little attention on the general program, the symposium on cutting fluids holds much significance for all automotive metalcutting plants. Joseph Geschelin, Detroit Editor, AUTOMOTIVE INDUSTRIES, urged adoption of three important proposals of vital interest to the user. First of these was a demand for a national survey of cutting fluid utilization. The objective of this effort is to develop a master recommendation chart that could be used by a manufacturing organization to determine the starting point for the kind of cutting fluid to be employed for a specific machining operation. This is not intended as a standard; it would be a recommendation which would serve as a guide to general practice. It is anticipated that the study would reveal the feasibility of reducing the number of basic fluids, thus making the problem of selection, storing, and dispensing much simpler and more efficient.

The second proposal was for the preparation of a uniform machinability table covering all materials being cut today. This project would rely primarily upon the current literature and would represent a reasonable compromise of values. An officially-sponsored chart of this kind would be of invaluable help to metallurgists and the operators of metal cutting establishments.

The third proposal would be an ASTM standard governing the methods to be employed in the shop testing of cutting fluids. It was brought out in discussion that such a standard would not be easy to prepare. But the matter is not considered insuperable.

In the March 1, 1957 issue of AUTOMOTIVE INDUSTRIES we published an article outlining the central office procedure for the management of cutting fluids within the far-flung Ford Motor Co. organization. At the symposium Wilfred J. Renaud, Engine Mfg. Engineering Staff of Ford Motor Co., presented an extensive report on the management of cutting fluids within the Engine and Foundry Division of the company.

The procedure described by Renaud has been aimed at reducing the number of kinds of cutting fluids employed, has standardized on the cutting fluids for similar operations in different plants, and has promoted a more efficient management of this important function. Results have been gratifying not only from the standpoint of cost but also of product quality and more efficient machine operation. ■

Bostrom Develops New Truck Seat

Bostrom Corp. of Milwaukee has developed a new truck seat with torsion bar suspension and a double-acting shock absorber to dampen spring action.

Bostrom's new Viking torsion-bar seat has a mechanism to adseat will be available to truck manjust to the driver's weight. The ufacturers in September. ■

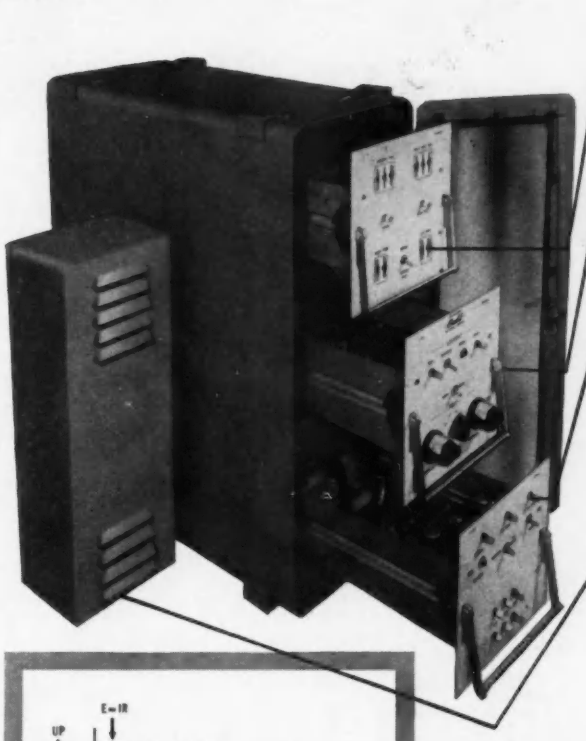
Monautronic V-2 welding control certifies weld quality... cuts rejects and production costs

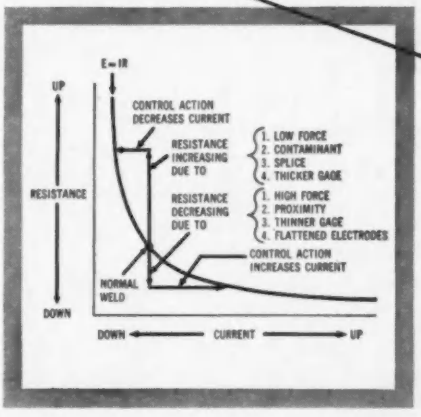
A resistance welding control that automatically compensates for every process variable

The new Monautronic V-2 welding control introduces the concept of feedback control to produce spot-welds of consistently high quality. It makes use of the latest advances in electronic computing to overcome automatically such obstacles to weld quality as line voltage fluctuation, electrode wear, variations in electrode tip force, surface finish and shunting.

The Monautronic V-2 compensates for undesirable variations usually encountered in resistance welding by maintaining voltage across a weld at a constant value. This constraint of voltage amounts to constraint of final weld temperatures, and such temperature control assures production of quality welds.

- **Automatic lockout**—occurs when process variations are so severe that the available current range would not cover the requirements for quality welding. The control detects extreme contamination, failure in the force system, overwelding, poor matching or fitup, and any other conditions that would result in substandard welds.
- **Automatic sequencing**—all provisions for single spot, roll spot or seam welding. Sequencing is 100% accurate, and exceeds NEMA standard specification 3B. Special sequence programming is available.
- **Transistorized design**—for high reliability, compactness, low power consumption.
- **Modular construction**—permits easy removal of the three modules and separate firing unit, simplifies maintenance.
- **Shock and vibration resistant construction**—for long, reliable service in even the most demanding applications.
- **Safety interlock**—for protection of personnel during tip dressing.
- **Tamperproof case**—prevents access to control by unauthorized personnel.





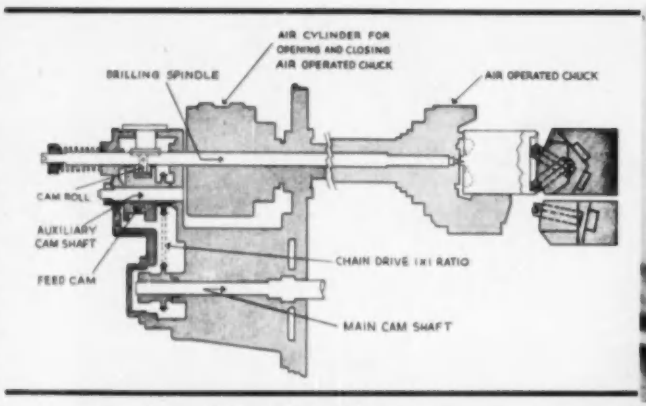
VOLTAGE CONSTRAINT

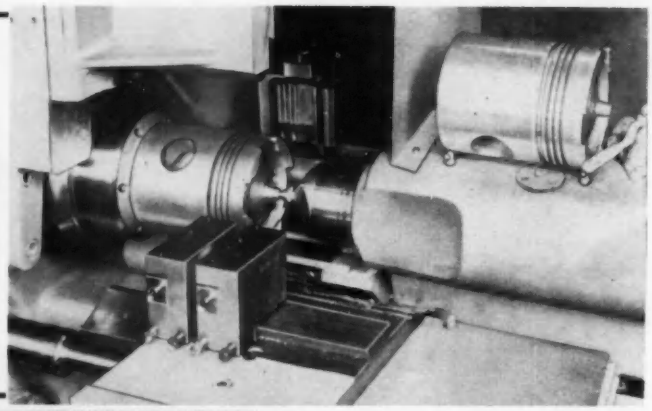
Graph shows how voltage control compensates for process variations. Any point on curved line E = IR represents a specific voltage. With normal weld as reference point, certain process variations cause increased resistance, while others cause a decrease. Control action is achieved through change of current to constrain voltage to same level for every weld.

for complete details contact: THE BUDD COMPANY
Electronic Controls Section • Philadelphia 32, Pa.

ELECTRONIC Budd CONTROLS

Circle 177 on Inquiry Card for more data





Left—
Schematic sectional view of the tooling for operations on first lathe (LN-18)

Right—
Close up of piston in the second Model LR lathe which performs final turning operations

Aluminum Pistons

(*Continued from page* 117)

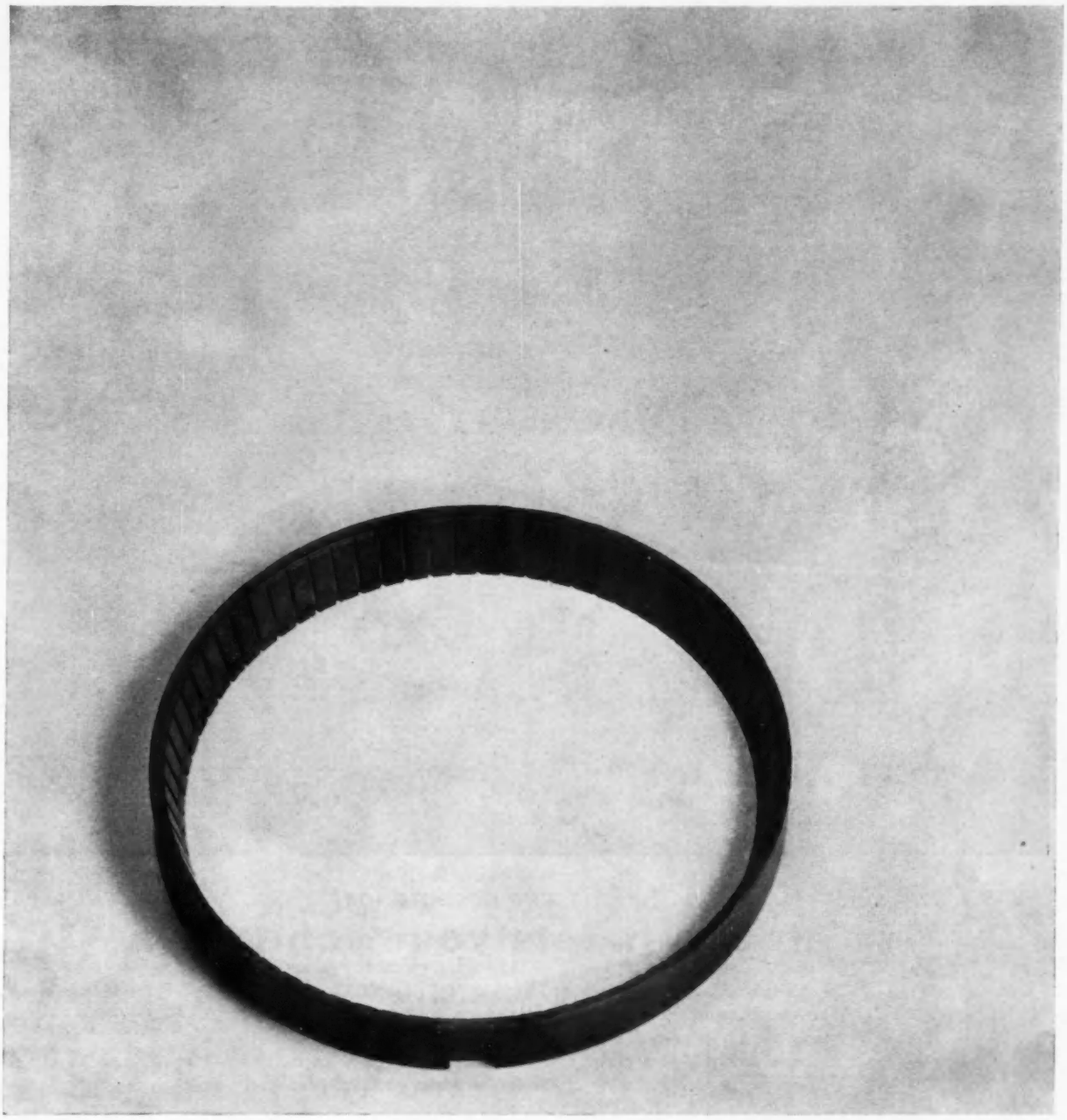
keyed to the camshaft housing to prevent rotation. When the centering operation is complete, the tooling is automatically disengaged and forced to retrace by cam action.

The second series of operations—in a Model LR automatic LoSwing lathe includes semi-finish turning OD with tools mounted on the front slide while tools mounted on the back slide are rough forming four ring grooves and facing the overall length. Then front and back slides retract and tools on the vertical slide come down to finish turn the four ring grooves.

The final turning operation on the piston is performed on a second Model LR lathe. In this operation, the skirt is finish turned using tools mounted in the front tool block while tools in the rear block finish form the top of the piston. Front tool block operations include: finish turn diameter leaving three scuff bands, finish turn ring bands, radius top corner 1/16 in. chamfer grooves 7/32 in. by 13 deg.

The final operation in this sequence is performed on a Model LN automatic lathe specially adapted for knurling. This is performed with the piston mounted on a driver with both right and left hand knurling knobs operating simultaneously. Two rolls, mounted at 180 deg, equalize the pressure on the piece.

The machining cycle on all of the machines is completely automatic; the operator simply loads and unloads the pistons and pushes the starter button. ■



YOU COULDN'T HAVE DONE THIS TWO YEARS AGO

They mold this reverse clutch cone from a phenolic reinforced with fibrous glass. Not just an ordinary phenolic, but one of the *newer* Durez phenolics . . . as unlike the plastics of the 1950's as are the cars of the two periods.

It weighs only 4 ounces, yet it can transmit the full power of a 1960 engine to a 2½-ton car.

This is but one of many new phenolics for new uses in tomorrow's vehicles. Others:

Phenolics for service wet on the inside and dry on the outside . . . *hose connectors*, for example.

A medium-impact phenolic for *distributor bowls* or to enclose accessory motors. Or for *air-cleaner bowls* that don't hum or rattle.

Reinforced phenolics for *oil-pump gears, transmission parts*—for *oil seals, bushings*—phenolics that outwear metal and cost less.

An important point to remember—

When you design for phenolics, you almost always get a better part at lower cost . . . even though lowered cost is not the immediate objective. Savings result from elimination of machining and other secondary operations.

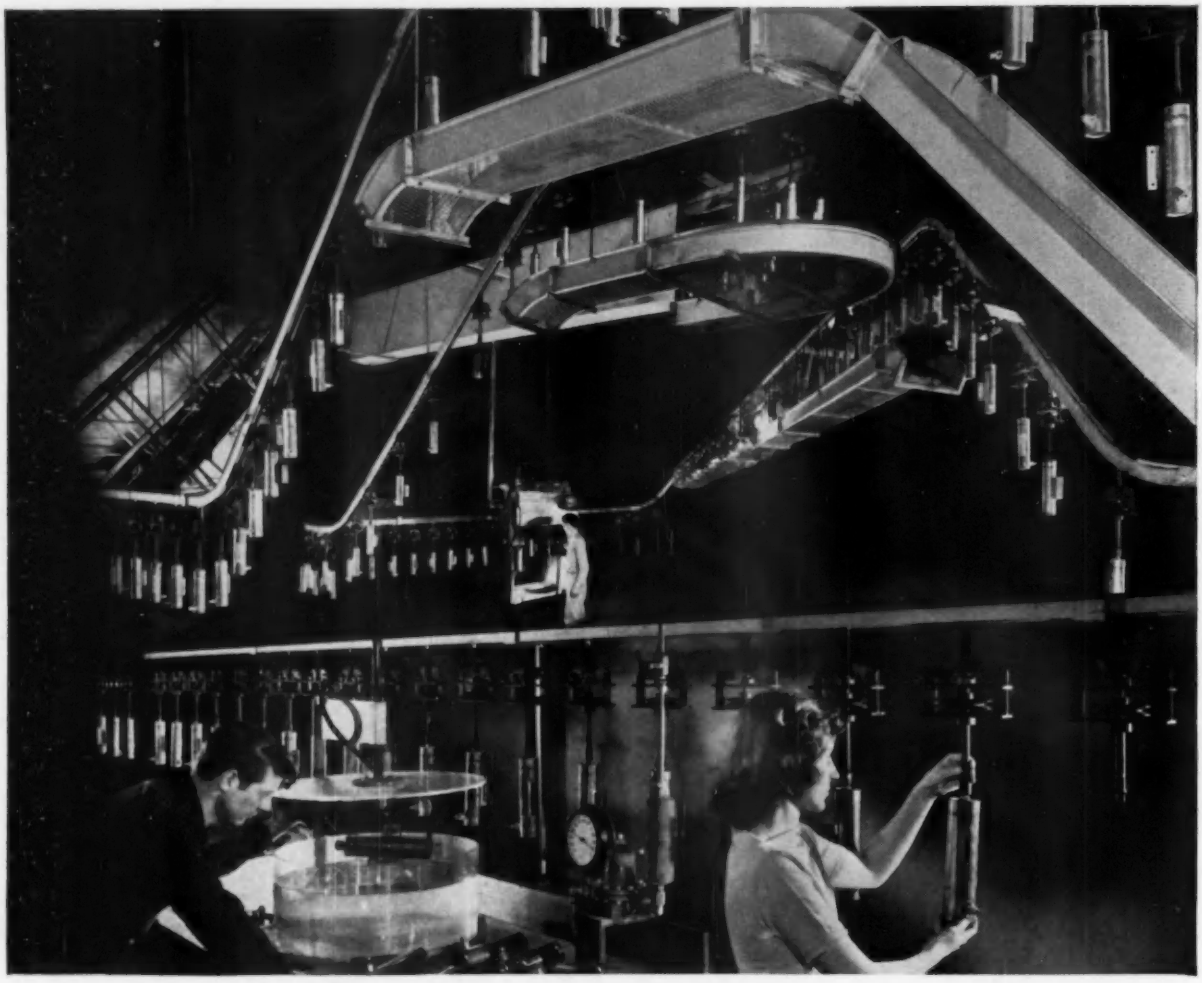
These newer, better phenolic formulations come in many combinations of properties to give you variety and versatility. More important, Durez can promise uniformity in these formulations, so that what works today will work tomorrow. Our Bulletin D400 has much more to say on these subjects. Write for it.

DUREZ PLASTICS DIVISION

8207 WALCK ROAD, NORTH TONAWANDA, N. Y.

HOOKER CHEMICAL CORPORATION

HOOKER CHEMICALS PLASTICS



The line of air-conditioning components that

always meets your schedules

High-speed facilities match production of Controls Company air-conditioning components or systems to your most critical peak-season needs. Thermostatic expansion valves, drier receivers, liquid indicators and distributors in many capacities, connections and operating characteristics can be mass-produced to fit your own production schedules.

Pioneers in the field of automotive refrigeration control since 1953, Controls Company of America's Heating & Air Conditioning Division has the engineering skill, the knowledge and the manufacturing techniques to bring you reliability. Systems for thermostatic by-pass . . . pressure actuated by-pass or any other can be supplied quickly at high-volume economy.

Talk to your nearest Controls Company representative about our ability to deliver quality systems or components for your automotive air-conditioning needs. Or write to Controls Company of America, Milwaukee 10, Wisconsin.

These independent automotive air-conditioner and automobile manufacturers rely on Controls Company of America:

CHRYSLER
FORD
AMERICAN MOTORS
FORD, MERCURY DIV.
ARA
CAPITOL
CLARDY
CLIMATIC AIR
FRIGIKAR
FRIGIQUIP
J. E. MITCHELL
PARKOMAT
NOVI

Creative controls for industry

CONTROLS COMPANY OF AMERICA

HEATING AND AIR CONDITIONING DIVISION

2415 N. 32nd Street, Milwaukee 10, Wisconsin • *Cookeville, Ontario • Postfach 313, Zug, Switzerland*

Circle 107 on Inquiry Card for more data

Expanded PRODUCTION FACILITIES at Link-Belt Speeder Corp.

By Kenneth Rose

PRODUCTION lines and facilities now in use by Link-Belt Speeder Corp. in Cedar Rapids, Iowa (construction equipment), subsidiary of Link-Belt Co., increase manufacturing capacity by about 40 per cent over that of the 1956 expansion. The new setup also climaxes a decade of plant expansion of the power shovel and crane manufacturer that began in 1947, when a program doubling the size of the original plant was instituted. Additional buildings were added in 1953, 1956 and 1957. Modernization of facilities and manufacturing equipment on a continuing basis, were included in this decade of growth.

The most recent program included a complete revamping of the flow of material through the plant's work areas, with some interesting arrangements for storage of parts in process. A very unique feature of the plant layout is an arterial aisle 20 ft wide through the center of the plant, at 90 deg to the parallel crane bays. It is kept clear at all times, permitting the ready movement and two-directional flow of industrial trucks, and even of semi-trailers, through the plant. As

What HORACE DREVER has to say about Lindberg heat treating equipment

Mr. Horace Drever, internationally prominent in the industrial heating field, is a Past-President of the Furnace Manufacturers Association and President of Drever Company, furnace manufacturers and commercial heat treaters.

QUOTE from Mr. Drever's unsolicited letter to Lindberg Engineering Company

"For the past three and one-half years, we have been operating one of your Type 243618 GVRT Furnaces along with a 500 CFH Lindberg Hyen generator in our commercial heat treating division. We are extremely pleased, not only with the fine quality of work turned out by this equipment but also its relatively trouble-free operation. As evidence of our complete satisfaction we have ordered another Lindberg Furnace of this type."

Lindberg Furnaces in operation at the Drever Company, Bethayres, Pennsylvania.

We are happy that Mr. Drever, a furnace manufacturer in his own right, originally chose Lindberg equipment for his heat treating plant and that its satisfactory service prompted an additional order. The second Lindberg Furnace is now in production at Drever Company, as the adjacent photo shows. Bless those satisfied customers! If you have a product or process in the metal or ceramic field requiring the application of heat you can depend on Lindberg's engineering and design know-how to provide exactly the right equipment to answer your need. Get in touch with your nearest Lindberg Field Representative (see classified phone book) or write direct to Lindberg Engineering Company, 2491 West Hubbard Street, Chicago 12, Illinois. Los Angeles plant: 11937 South Regentview Avenue, Downey, California. In Canada: Birlefco-Lindberg, Ltd., Toronto.

LINDBERG
heat for industry

this arterial aisle borders on the principal manufacturing departments of the plant, including machining, welding, heat treating, and forming areas, it makes possible the movement of heavy parts, and/or new machinery, into or out of the work areas, direct from trucks to the work areas with overhead cranes.

Rough castings and forgings are taken from the receiving and inspection areas to a cleaning area, and from there may be annealed and painted in a dip operation or by spray painting. Those pieces that are to be finish machined go to the machine lines direct from these operations, or to the raw castings storage area. Structural steel is flame cut, sawed, or sheared to size and shaped in a "cut-off" building in the steel storage area, then moves to the heavy welding area or to the fabrication department for additional operations. Weldments are stress relieved in a double car-bottom furnace, so that one car can be loaded or unloaded while the other is in service in the furnace.

Castings, forgings and weldments, after moving through the machinery and final inspection area, can be taken to the heavy machining department and after machining can be moved from the line by an elevator to a finished parts storage area on the mezzanine of the building. Parts move from this storage area by means of a down elevator to the assembly lines. The very large parts are processed for weathering and transported to an outside area for temporary storage.

As clutches and gearing form an important part of the mechanism for power shovels and cranes, a special shafting process bay has been set up in a part of the heavy machining area. Heat treating is likewise a separate operation, with induction equipment, gas carburizing furnaces, provisions for oil and water quenches, and draw furnaces.

The company does not make engines, so standard engines of the types most frequently specified by its customers are kept in a special storage area for delivery to the assembly line.

A storage technique worked out by company engineers provides for three levels of standard metal bins, set up over an area of 3100 sq ft of floor space to give storage equivalent to that on three times the area. The entire unit is made self-supporting by use of welded-in flooring of pierced steel sections, the flooring and bins welded into a unit at the second and third levels. The pierced metal flooring in this way serves as horizontal stiffening for the three-high stacks of bins. Bin shelves on the first level were designed for a load of 1800 lb, and for 1500 lb on the second and third levels. Storing is arranged so that heavier and faster-growing items are placed on the first level, slower-moving items on the two upper levels.

The first level is serviced by a powered fork lift truck, the second level by either a fork lift truck or the overhead crane to a landing platform, and the third level by the overhead crane only. After the material is delivered to

(*Turn to page* 144, *please*)

EVANS PRODUCTS COMPANY ALSO PRODUCES: Railroad loading equipment; bicycles and velocipedes; Evanite® plywood, hardboard and Plywall®; Evanite Battery Separators; Haskelite building panels, Plymetl® and doors.

EVANS ®

REGIONAL REPRESENTATIVES: Chicago, R. A. Lennox
Detroit, Chas. F. Murray Sales Co. • Allentown, Pa., P. R. Weidner

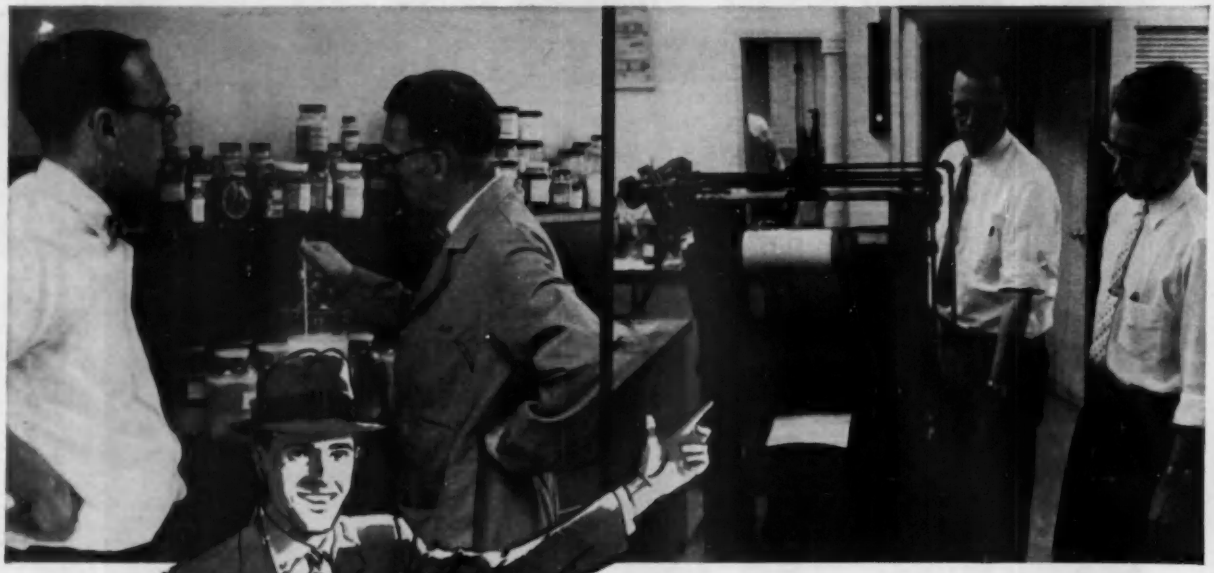
WRITE TO

EVANS PRODUCTS COMPANY PLYMOUTH MICHIGAN

RESEARCH DEVELOPMENT

Practically all of the advances in surface treatments for metals have come from the big, ingenious Parker research staff. This consultation is on a new treatment for hot dip galvanized.

An improved Parker product for use in laminating plastic to metal undergoes checks and tests in the development lab. Parker products are carried from test tube to production line by Development.



Here's why the are Parker's conversion

Start with the experience and knowledge of the field which has built the Parker line. Our restless search for new ways and better ways to protect metals and increase finish durability has been continuous for almost fifty years, and has produced practically every major advance in the science.

Add Parker's free engineering service. Our staff engineers have designed literally thousands of practical, money-saving surface treating installations. This no-charge service includes detailed drawings and specifications —complete data ready for you to turn over to equipment builders for bids.

FIELD SERVICE

The Parker field service representative, stationed near you, averages 14¾ years of experience in the conversion coating field.

TESTING SERVICE LABS

A corner of the testing labs, with the photomicrograph camera in use. Facilities include salt spray and humidity test rooms, outdoor exposure fields, equipment for all accepted testing procedures.

Customer Service Labs take your materials, treat them in Parker's $\$1/4$-million production line equipment, test the results obtained. Photo shows stock scheduled for 125′-long strip Bonderite machine.

biggest bargains in the business *coatings for your products*

Consider the qualifications of the Parker man who lives nearby and serves you. Our technical representatives have an average of $14\frac{3}{4}$ years of experience, equipping them to work with you and help you. They're practical, service-minded men, who bring understanding, ingenuity and dedication to you and your plant.

Back in Detroit, there are some 45 men working for you. These are our research and development people, manning the largest research program in the surface treatment field. Their discoveries of new processes, improvements and refinements are tested, proven, and passed on to you for your profit.

A $\$1/4$-million investment on your behalf is the production line Customer Service Lab. It's organized as an extension of your research and development program. Here we take your materials and treat them on a production line basis to work out the proper processing procedure, set time cycles, solve a cleaning problem, prepare material for experimental manufacture in your plant. All without charge.

For the low cost of the Parker chemical alone, you get this complete package of service and satisfaction. *It's the biggest bargain in the business.*

Parker Rust Proof Company
2178 E. MILWAUKEE, DETROIT 11, MICHIGAN

BONDERITE corrosion resistant paint base • BONDERITE and BONDERLUBE aids in cold forming of metals • PARCO COMPOUND rust resistant • PARCO LUBRITE—wear resistant for friction surfaces • TROPICAL—heavy duty maintenance paints since 1883

*Bonderite, Bonderized, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.

Since 1914—leader in the field

Expanded Production

(*Continued from page* 140)

the proper level, it is handled by a manual pallet transporter, equipped with fiber wheels to reduce noise when moving over the pierced metal flooring. The flooring is designed for a loading of 6000 lb per sq ft to give it adequate strength for the concentrated loads of the handling equipment.

All of the bin, shelving and flooring units are standard except for the leg angles.

There are four parallel assembly lines in the assembly area. The upper and lower components for the cranes and shovels are assembled separately, and joined at about the sixth station on the line. Subassemblies and components are fed to bins and special racks at the stations along the line during off-assembly hours. At the first stations the assemblies are lifted from station to station by overhead cranes, but when the upper and lower subassemblies are united the unit becomes self-propelling and moves under its own power for the rest of the trip down the line. The sub-assembled cab is placed on the machine just before final painting.

Just before the attachments are added, the machine goes onto a down-draft paint spray area that has unusual features. Spray painting is used, but because of the heights and width of the assemblies, enclosures are impractical. The down-draft painting system in use was designed for the Link-Belt Speeder plant by DeVilbiss Metal Fabricator Co., Detroit, to meet the special conditions. Each consists of a pit, in the assembly line, each 43 ft, 10 in. long, and 9 ft deep, and 20 ft wide. Both are covered with metal gratings, and have preformed concrete slabs that act as bridges for the machines to travel over. These are designed for a load of 20,000 lb per sq ft, while the gratings are required to carry only personnel and light loads. Gratings and slabs are supported by channels on 2-ft centers, the channels in turn being mounted on I-beams. The I-beams are carried on 6-in. standard pipe columns.

The down-draft that keeps the sprayed paint from being carried about the shop is created by two 30,000 cfm Vaneaxial exhaust fans. Each of these is driven by a 30-hp motor. A water wash is used to trap paint particles carried on the current of air, and two 900 gpm circulating pumps, each driven by a 10-hp motor, recirculate the 8890 gal of water in the pits. In addition, there is a small sludge pump to be used when cleaning the pits.

As some of the painting is done as high as 16 ft above the floor, a strong down-draft is needed to control the paint spray. Total grate area over the booths is 240 sq ft. With 60,000 cfm of air moved by the exhaust fans, the air velocity at the floor is 250 fpm. This has controlled the paint spray so successfully that there is no paint visible on the floor or equipment around the pit.

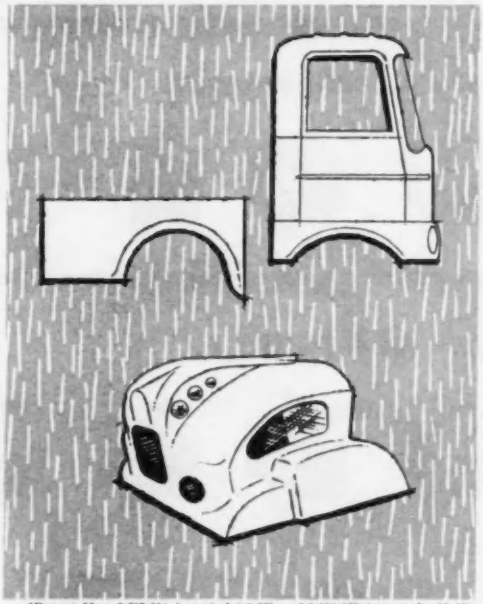
Use of down-draft spray painting gives better control of over-

(*Turn to page* 148, *please*)

RAND FIBER-RESIN SPRAY-UP

process incorporates strength, less weight in trucks

Spray-up...not lay-up...cuts manufacturing costs...permits more parts from fewer molds



*Patent Nos. 2,787,314 (granted 4-2-57) and 2,933,125 (granted 4-19-60). Canadian Patent Nos. 524,774 and 576,345. Copies available on request.

Basic development work by Rand in perfecting their patented* fiber glass spray-up process is giving truck manufacturers a new perspective in weight and strength factors for cabs, fenders and other body components.

Some manufacturers are presently building fiber glass components, using the so-called "hand lay-up" process, which is rapidly becoming obsolete, due to time and material costs. The Rand Fiber Glass Gun, because of its high efficiency in blending fiber glass, resins and catalysts in one simple spray-up operation, has cut all of these operational and material costs by as much as 50% in many cases. More parts from fewer molds in less area is the result.

So that truck manufacturers may enjoy all the production advantages of the Rand Gun, we offer, at reasonable cost, an attractive licensing plan and the service of skilled technical personnel who will:

1. Evaluate your production problem
2. Recommend proper resins and formulations
3. Design or help re-design molds or forms
4. Recommend and/or develop additional production processes or techniques, if necessary
5. Train your production personnel

Write or call us today for a new brochure which gives you complete information on the Rand Gun and Rand's services. Write Dept. A17, Rand Development Corporation, 13600 Deise Avenue, Cleveland 10, Ohio.

2096-RD

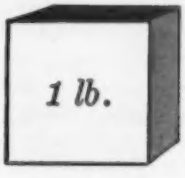
The exciting world of tomorrow is on hand at Rand today.

RAND DEVELOPMENT CORPORATION

DOW | MAGNESIUM

IN JUST 2 MINUTES, MONEY BY SWITCHING TO

*Magnesium's light weight gives you up to **4** times as many die castings from an equal weight of metal!*

from 1 lb. of zinc 	*you get only 1 part* 
from 1 lb. of aluminum 	*you get only 2⅔ parts* 
from 1 lb. of magnesium 	*you get **4** parts* 

Magnesium gives you other savings, too . . .

- Up to 50% faster casting rate than aluminum
- Easiest of all metals to machine. Less wear and tear on tools. Faster production
- Lightweight magnesium is easier to handle. Saves shipping costs

For more information check with your die casting supplier or write to: Automotive Development Engineering, Magnesium Sales Department 1102T7-15, THE DOW CHEMICAL COMPANY, Fisher Building, Detroit, Michigan.

FIGURE HOW YOU CAN SAVE MAGNESIUM DIE CASTINGS

Figure the metal cost per part yourself—

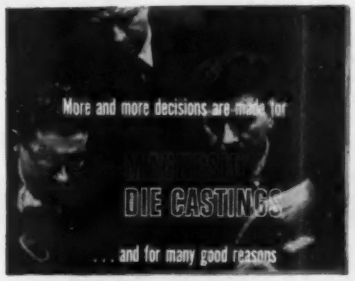
Just insert the price per pound of metal and divide to find the relative cost of zinc, aluminum and magnesium

(price per pound of zinc): $\frac{\qquad}{1}$ = *(cost per part)*

(price per pound of aluminum): $\frac{\qquad}{2.67}$ = *(cost per part)*

(price per pound of magnesium): $\frac{\qquad}{4}$ = *(cost per part)*

SEND FOR free Magnesium Die Castings Booklet. Covers design notes, properties, applications, etc. Magnesium Sales Department, THE DOW CHEMICAL COMPANY, Midland, Michigan.



THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

Expanded Production

(*Continued from page* 144)

spray than is the case with conventional spray painting in a booth, say company officials. Overspray paint is pulled downward regardless of spray gun direction. There is a considerable saving of floor space on the assembly line. There is no paint odor about the paint area, indicating complete removal of volatiles and therefore reduction of the fire hazard. In addition to removing the size limitation upon the work, doing away with the paint booth makes it possible to use the overhead cranes for handling all work through the paint area.

All of the parts excepting the machined surfaces are prepainted before coming to the assembly line. All castings, forgings, and similar parts are painted before processing in the machining and turning area. Weldments are painted after stress relieving, shot blasting and inspection. All parts for the upper machine are painted red, those for the lower assembly black.

At the end of the paint area, the attachments (shovel-crane-trench-hoe) which have been assembled and prepainted, go on the machine. Machines are then run to the test area for final tests before shipping. A railroad spur into the company's grounds makes rail shipments simple, and loading ramps are available for loading and unloading both flat cars and highway carriers for in or out bound shipments. ■

U. S. Jeep Contracts Total $16 Million

Willys Motors has received three government contracts totaling nearly $16 million for production of Jeep vehicles. Two contracts from the Army Ordnance District in Cleveland, valued at $9.7 million, call for 5228 vehicles and spare parts for the Marine Corps, the Venezuelan army and Turkish army. Included are 4000 Jeep Universals which will be shipped knocked down from Toledo, O., for assembly by Turk Willys-Overland Fabrikalari at Tuzla, Turkey.

The third contract, for more than $6 million, calls for 3210 Jeep Fleetvan trucks for the Post Office Department. This new vehicle, with right-hand drive and automatic transmission, is designed for easy pickup and delivery of mail along multi-stop routes.

The Jeep Fleetvan is built for an 80-in. wheelbase with an overall length of 133 in. The Jeep four-cylinder F-head engine will be used.

C. W. Moss, vice president in charge of sales, said the first Feetvans will be delivered to the government about Nov. 1. He added the vehicle will be offered in a commercial version later on as a regular part of the Willys line.

The Post Office order, Mr. Moss reported, is the largest non-military order for Jeep vehicles ever received by the company.

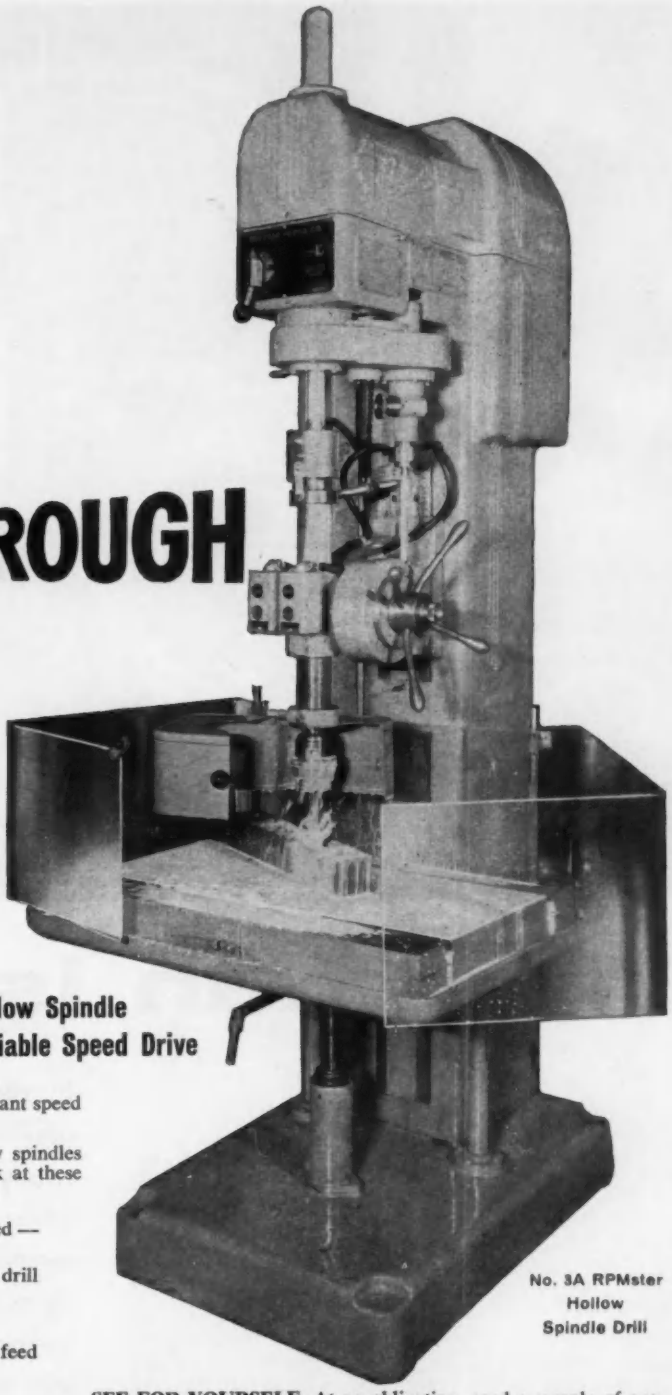
Booth Gets AMA Post

Bruce G. Booth, of the General Motors Corp. legal staff, has been elected chairman of the Committee on Vehicle Regulation of the Automobile Manufacturers Association.

A MAJOR BREAKTHROUGH NOW

IN "PROBLEM" DRILLING!

Buffalo RPMster with • Hollow Spindle • Variable Speed Drive



No. 3A RPMster Hollow Spindle Drill

Buffalo pioneered the RPMster's variable speed drive — instant speed changes while drilling.

Now, *Buffalo* brings you the RPMster with special hollow spindles to shatter concepts of formerly "impossible" drilling. Look at these test results:

316 STAINLESS STEEL — ¾″ drill, 700 rpm, .001″ feed — 4″ deep; ½″ drill, 900 rpm, .001″ feed — 4½″ deep.

TOOL STEEL SHEAR BLADES Hardened to 54 R c. ½″ drill — 800 rpm .001″ feed — 2½″ through.

RENE 41 — ½″ hole @ 750 rpm .001″ — 3″ through.

BERYLLIUM BRONZE — ½″ hole @ 6200 rpm hand feed through 2½″ in 1½ seconds.

TITANIUM — ⅜″ hole @ 1000 rpm .002″ feed.

CAST IRON — ¾″ hole @ 2000 rpm. 004″ feed.

52-100 ALLOY STEEL — 7/16″ hole @ 800 rpm .001″ feed.

SEE FOR YOURSELF. At no obligation, send a sample of any hard-to-drill material to the factory. We will test-drill it and return the sample with a report on the drilling tests. Send your sample today, and write for details!

"Buffalo"

BUFFALO FORGE COMPANY

BUFFALO, NEW YORK

Buffalo air handling equipment to move, heat, cool, dehumidify and clean air and other gases.

Buffalo Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.

Buffalo Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

Squier machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.

See 'Buffalo' Machine Tools in Action at Machine Tool Exposition... Booth 551

This man is working

If you have never visited Michigan Tool's research and development laboratory, you really should. The birthplace of so many ideas—processes, equipment, tools and materials—industry today takes for granted, its activities have grown enormously with the broadening of Michigan Tool's services to industry.

The lab has two purposes.

The first, to find the answers to your immediate questions—in every phase of gear

Michigan Tool Company

MTC Research Engineer using an angular interferometer to check an indexing table. Accuracies to a millionth of an inch at 1 inch radius are possible with this equipment. Interferometer room temperature is controlled to ¼° F.

for YOU

production, in automation, in generating of forms in hard materials, in producing prototype gearing, etc.

Its second job is to find the solution to some of the problems you will face tomorrow —to keep up the pioneering pace of engineering leadership that produced such innovations as gear shaving, Roto-Flo cold forming, Shear-Speed gear cutting, double-enveloping gearing, "Velvet-drop" feeders and other ideas for automation systems, Sine-Line optical checking, and many others.

MMT PE

7171 E. McNICHOLS ROAD • DETROIT • TW 1-3111

Plants in: Detroit, Traverse City and Manistee, Mich. and Windsor, Ontario.

Gear Production: The most complete line of equipment for gear production offered by any manufacturer.

Hobbers and Shapers for Job Lots
High Production Hobbers
Shear-Speed Gear Shapers
Roto-Flo Cold Forming
Shavers for gears of ½" to 200"
Internal and External Form Grinders
Sine-Line Gear and Tool Checkers
Gear Chamfering Equipment
Abrasive Gear Finishers
Mitco Quality Gear Cutting Tools

Automation Equipment (Gear-O-Mation Division): Engineering and manufacture of simple and practical equipment for automating a plant, a line, or a machine. Pre-engineered units for orienting, storage, loading, unloading, assembling, conveying, escapements, positioning, elevating, deeding.

Form Grinding (Gear Grinding Machines Division): "Detroit" fully automatic form grinders for both external and internal contours—involute, cycloidal, spherical, straight sided.

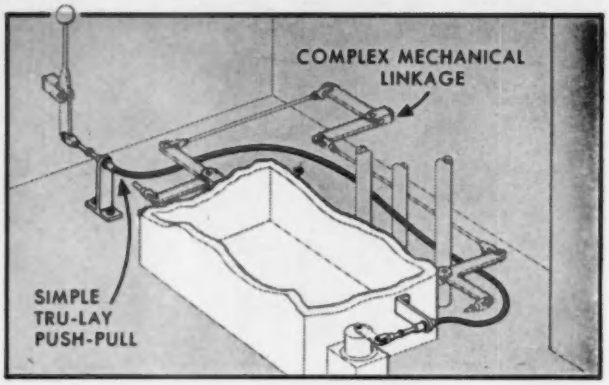
Prototype Gearing (Enterprise Division): Spur, helical, bevel gears and splines for prototypes and in developmental quantities. Also contour form grinding, internal and external.

OTHER MICHIGAN TOOL DIVISIONS INCLUDE:

Cone-Drive Gears Division (double-enveloping worm gears, speed reducers, gear motors); Michigan-Lorenz Division (hobbers and shapers); Shear-Speed Chemical Products Division (coolants and cutting oils); Colonial Tool Co. of Canada Ltd. (cutting tools of all types).

TRU-LAY *PUSH*-PULL CONTROLS PROVIDE ACCURATE, DEPENDABLE REMOTE CONTROL FOR HUNDREDS OF PRODUCTS

• If your products involve remote control—electrical, hydraulic, pneumatic or direct—TRU-LAY PUSH-PULL FLEXIBLE CONTROLS can help solve your design problems. They provide positive remote control over long or short distances—up to 150 feet from the control point. Because they operate while flexing, they can snake around obstructions. They will not buckle. They are ruggedly constructed, easily installed and operated, sealed against dirt and moisture, and will handle jobs with as much as 1,000 lbs. input. PUSH-PULL CONTROLS are simple, have but one moving part, are noiseless, and give a lifetime of accuracy. Mechanical linkages, on the other hand, are complex. Unlike PUSH-PULL CONTROLS, they are made of many parts, wear at many points, and produce increased backlash, lost accuracy, and vibration rattles.



Sizes and Operating Heads to Fit Your Design

Control Dimension	Minimum Recommended Radius in Inches	Maximum Input Load in Pounds (Dependent on Travel)
3/32"	2	30
1/8"	3	65-125
3/16"	5	115-175
1/4"	6	300-600
5/16"	8	700-1,000

Heavy Duty • For use where rugged duty prevails, but where operation must be smooth and accurate. Meets all requirements for dependability and life.

Light Duty • Gives smooth, accurate and dependable performance at low cost. Available with your choice of several types of knobs.

Selective Friction • Amount of friction can be changed to meet individual requirements of the operator or application. Friction constant at any setting.

Position Lock • A slight turn of the T-type handle locks the control in any position. Available in two sizes for light and heavy-duty applications.

Micro Control • Push or pull the knob for instantaneous response, then rotate knob for vernier adjustment. Built for smooth, efficient operation on any job.

PUSH-PULL DATA FILE shows how to simplify, improve design

PUSH-PULL CONTROLS are solid as a rod and flexible as a wire rope. They're factory-lubricated for life, unaffected by temperature extremes, and can be adapted to practically any application. For complete details on how you can use them, write for the PUSH-PULL DATA FILE. It contains 7 engineering Bulletins which describe in detail the operation of PUSH-PULL CONTROLS, their applications, features and advantages. Our engineers will be glad to help you make TRU-LAY PUSH-PULL CONTROLS a part of your product.

PUSH-PULL CONTROLS

Automotive and Aircraft Division • American Chain & Cable Company, Inc.

601-H Stephenson Bldg., Detroit 2

6800-H East Acco Street, Los Angeles 22 • 929-H Connecticut Ave., Bridgeport 2, Conn.

ACCO

Circle 194 on Inquiry Card for more data

Circle 195 on Inquiry Card for more data

if cost reduction is your problem

value analysis *dictates*

NATIONAL HTM CASTINGS

To make or buy — to cast, forge or fabricate — that is often the question.

Before you decide, look into the advantages of National HTM (pearlitic malleable) castings over other methods of forming.

Among the great advantages of National HTM castings are closer as-cast tolerances that often eliminate machining operations . . . excellent response to subsequent hardening operations, either induction or flame . . . easy machinability on your present equipment . . . high ultimate strength . . . excellent non-seizing bearing qualities . . . air or liquid quenching . . . ability to be smooth-finished.

Yes, Value Analysis often makes the use of *National HTM castings a must.* And remember National HTM castings can be precision cast by the shell mold, CO_2 or green sand methods. Production costs tumble . . . performance and salability of your product spurt — with National HTM (pearlitic malleable) castings.

AA-9358

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

Established 1868 — *Cleveland 6, Ohio*

The nation's largest independent producer of malleable and pearlitic malleable

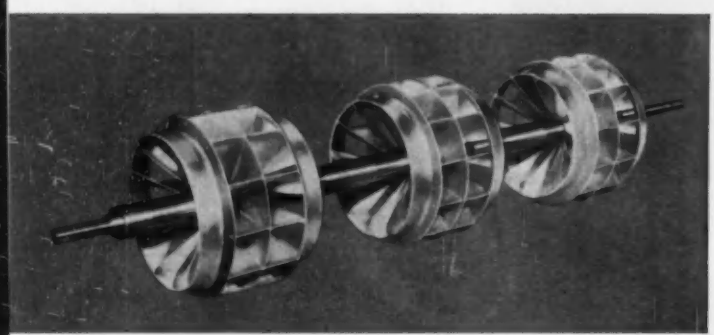
MEMBER

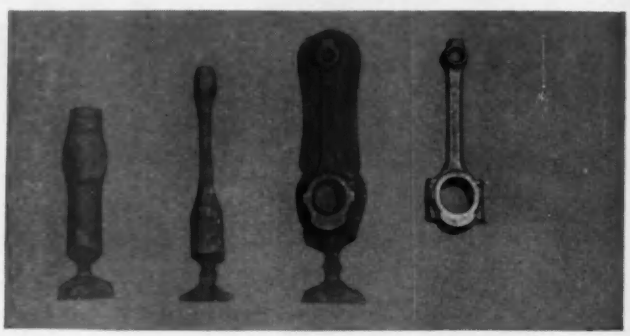
MALLEABLE CASTINGS COUNCIL

Important Physical Properties	
Brinell	163 to 302*
Yield, psi	48,000 to 85,000*
Ultimate, psi	70,000 to 110,000*
Elongation, %	7 to 2*

**Depending upon grade*

THE "BEAUTY" OF REPUBLIC STAINLESS

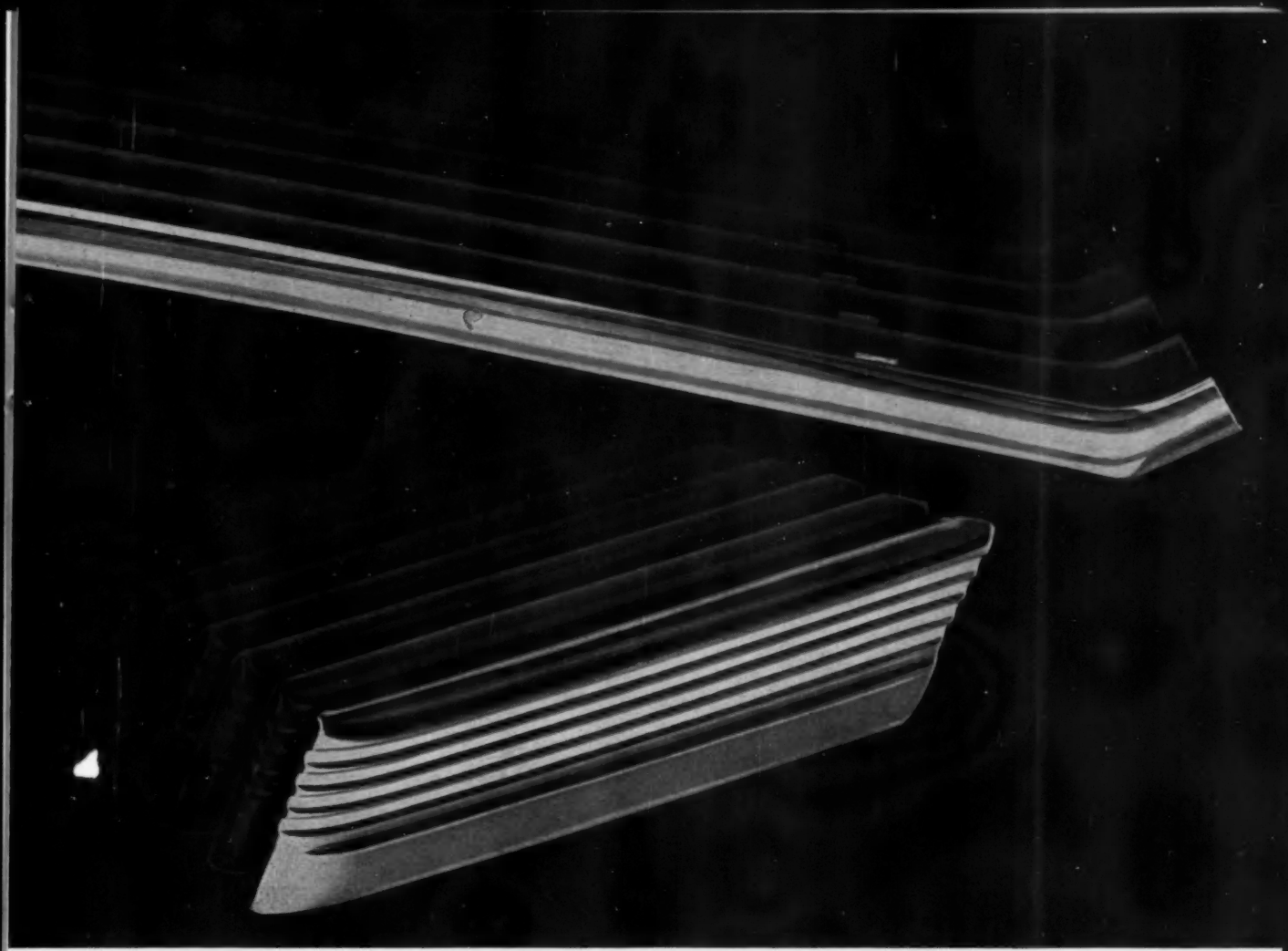




TO ELIMINATE MACHINING: Buffalo Forge Company uses Republic ELECTRUNITE® Mechanical Tubing for rotor shafts up to 94" long. Close-tolerance concentricity of ELECTRUNITE is vital. Turning at 1,110 rpm, these shafts require exact balance to maintain high operating efficiency. Republic ELECTRUNITE Mechanical Tubing is available in carbon and stainless steel. Mail coupon for details.

TO CUT REJECTS: Herbrand Division of the Bingham-Herbrand Corporation uses Republic AISI-8637 Hot Rolled Alloy Steel in forged connecting rods. Non-varying uniformity has resulted in substantial production economies. 2⅛" bars undergo 11 forging operations. This is followed by heat treatment which produces the mechanical properties designed into the forgings. Send for details on Republic Alloy Steel.

TO SOLVE VIBRATION PROBLEMS: Special nylon inserts in Republic NYLOK® Bolts and Nuts assure a permanent lateral thrust between opposite mating threads. The ideal, single-unit answer to vibration, NYLOK Fasteners have no cotter pins, set screws, lock washers, wiring, or heads. Return coupon for complete information.



High-speed forming proves it!

Deep-down uniformity—that's the "beauty" of Republic Stainless Steel. You enjoy the exact physicals required for high speed, low-reject forming operations. This is *consistent* quality that does away with needless scrap loss.

The trim above—stamped rather than roll formed—is produced by Applied Arts Corporation, Grand Rapids, Michigan. Type 430 Republic ENDURO® Stainless Steel is blanked, rough drawn, rough curled, cam-flanged, finish curled, notched, and polished. Reject loss, according to Applied Arts, is at an absolute minimum.

Our field metallurgists can help you solve and avoid costly problems. Let them help select, apply, and process the stainless steel best suited to your requirements. Contact your Republic representative or mail the coupon below.

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

This STEELMARK of the American Steel Industry tells you a product is made of Stainless Steel. Look for it when you buy. Place in on products you sell.

Circle 164 on Inquiry Card for more data

REPUBLIC STEEL CORPORATION
Dept. AI-9181
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send more information on:

- ☐ Republic Stainless Steel
- ☐ ELECTRUNITE Mechanical Tubing
- ☐ Hot Rolled Alloy Steel
- ☐ NYLOK Bolts and Nuts.

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

More Government Contract Awards

LATEST contracts awarded by various Government agencies, and covering primarily automotive and aviation products, are listed in the following. Typical of the items contained in these monthly listings are: passenger cars, motor trucks, aircraft, military tanks, engines, transmissions, other components, spare parts, plant equipment, etc. This list is for the period May 24 to July 1, inclusive.

ALLIS-CHALMERS MFG. CO.
Forklift trucks, 5 ea—$28,277

AMERICAN MACHINE & FOUNDRY CO., Greenwich, Conn.
36 new launcher systems—$81,576,000

AMERICAN MOTORS CORP., Detroit, Mich.
Automobiles, 10 ea—$14,160

BOWEN - McLAUGHLIN - YORK, INC., York, Pa.
212 tank recovery vehicle—$20,000,000

BOWERS BATTERY & SPARK PLUG CO., Reading, Pa.
Automotive storage batteries, indefinite quantity

CHAMPION SPARK PLUG CO., Toledo, Ohio
Spark Plugs: aircraft, 80,900 ea—$120,460

CHEVROLET MOTOR CO., Detroit, Mich.
385 pickup trucks and truck chassis—$553,171

CHRYSLER CORP., Detroit, Mich.
Repair parts on missile—$6,642,496

CHRYSLER CORP., Detroit, Mich.
Missile ground support equipment—$661,110

CHRYSLER CORP., Detroit, Mich.
Missile components—$1,421,851

CHRYSLER CORP., Detroit, Mich.
Missile systems—$8,755,000

CHRYSLER CORP., Detroit, Mich.
Modification services, missile system—$714,264

CHRYSLER CORP., Detroit, Mich.
720 tanks—$60,000,000

CHRYSLER MOTORS CORP., Washington, D. C.
Light trucks, 16 ea—$53,226

CHRYSLER MOTORS CORP., Washington, D. C.
Passenger cars, 60 ea—$106,160

CHRYSLER MOTORS CORP., Washington, D. C.
Sedans, 64 ea—$113,912

CHRYSLER MOTORS CORP., Washington, D. C.
Station Wagons, 6 ea—$12,214

CHRYSLER MOTORS CORP., Washington, D. C.
Trucks, 161 ea—$434,544

CHRYSLER MOTORS CORP., Washington, D. C.
Trucks and Automobiles, 129 ea—$199,673

CHRYSLER MOTORS CORP., Washington, D. C.
Vehicles, 12 ea—$37,023

CLEARING DIV., U. S. INDUSTRIES, INC., Chicago, Ill.
Lathe, heavy duty, 1 ea—$72,634

CONSOLIDATED DIESEL ELECTRIC CORP., Stamford, Conn.
Engine, gasoline, 8 cylinders, 72 ea—$128,170

CONTINENTAL MOTORS CORP., Muskegon, Mich.
50 engines for tank—$699,415

W. S. DARLEY & CO., Chicago, Ill.
Heavy trucks, 5 ea—$51,365

DEMPSTER BROTHERS, INC., Knoxville, Tenn.
Truck, material handling, 5 ea—$41,385

DIAMOND T MOTOR TRUCK CO., Chicago, Ill.
Truck, Tractor, 9 ea—$140,702

THE ELECTRIC AUTO-LITE CO., Toledo, Ohio
Automotive Storage Batteries, indefinite quantity

ESTEE BATTERY CO., Los Angeles, Calif.
Automotive Storage Batteries, indefinite quantity

FIRE MASTER CORP., Mt. Clemens, Mich.
Truck, Fire, Powered Pumper, 35 ea—$203,625

FOOD MACHINERY & CHEMICAL CORP., San Jose, Calif.
1380 armored personnel carriers—$34,400,000

FORD MOTOR CO., Dearborn, Mich.
1,052 station wagons—$1,694,716

FORD MOTOR CO., Dearborn, Mich.
579 light sedans—$770,601

FORD MOTOR CO., FORD INTERNATIONAL GROUP, Jersey City, N. J.
Sedans, 3 ea—$11,308

FORD DIV. OF FORD MOTOR CO., Washington, D. C.
Dump trucks, 10 ea—$49,282

FORD DIV., FORD MOTOR CO., Washington, D. C.
Light trucks, 511 ea—$871,873

FORD DIV., FORD MOTOR CO., Washington, D. C.
Trucks, 44 ea—$147,232

FORD MOTOR CO., GOVERNMENT SALES DEPT., Washington, D. C.
Trucks, 10 ea—$43,492

(*Turn to page 158, please*)

YOU CAN GET PROMPT FORD INDUSTRIAL ENGINE SERVICE EVERYWHERE

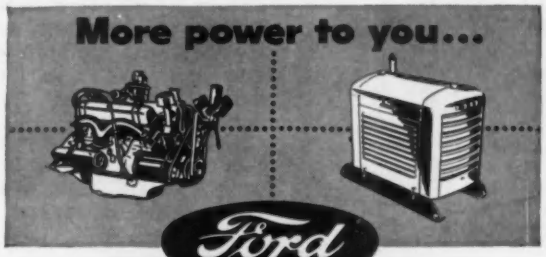
(including Hawaii and Alaska)

Whatever your job, wherever it takes you, you'll always find a Ford Dealer nearby to give quick assistance in solving any industrial engine problem.

Because this world-wide network of Ford Dealers offers speedy parts delivery and can arrange on-the-job service, your downtime costs are held to a minimum. Because Ford Dealers carry a stock of normal replacement parts, you need never invest in a large parts inventory of your own.

Also ready to serve you from coast to coast is a network of Ford Industrial Power Headquarters. They have the facilities and experience to repower your equipment, regardless of make, with a dependable, low-cost Ford Industrial Engine or Power Unit. Ford engines range from 134 to 534 cubic inches, including three highly efficient Ford diesels. As a bonus, *all Ford engines offer a higher horsepower-to-weight ratio than ever before possible.*

To get the *right* engine for your application, call or visit your Ford Industrial Power Headquarters.



Ford
INDUSTRIAL ENGINES
AND POWER UNITS

INDUSTRIAL ENGINE DEPARTMENT, FORD DIVISION, FORD MOTOR CO., P.O. BOX 598, DEARBORN, MICH.

West of Rockies write to:
FORD INDUSTRIAL ENGINE DEPT., P.O. BOX 6787, LOS ANGELES 22, CALIF.
FORD INDUSTRIAL ENGINE DEPT., P.O. BOX 1666, RICHMOND, CALIF.

Circle 163 on Inquiry Card for more data

Contract Awards

(*Continued from page* 156)

FORD MOTOR CO., INTERNATIONAL DIV., Jersey City, N. J.
Tractors & Implements, 1 lot—$12,769

DELCO REMY, DIV. OF GMC, Anderson, Ind.
Automotive Storage Batteries, indefinite quantity

THE GARRETT CORP., AIRESEARCH MFG. DIV., Phoenix, Arizona
295 small gas turbine engines

GAR WOOD INDUSTRIES, INC., Wayne, Mich.
Truck, Refuse Collection, 105 ea—$376,686

GENERAL MOTORS CORP., CHEV. MOTOR DIV., Detroit, Mich.
Light trucks, 136 ea—$278,693

GENERAL MOTORS CORP., CHEV. MOTOR DIV., Detroit, Mich.
Trucks, 237—$2,858,362

GENERAL MOTORS CORP., CHEV. MOTOR DIV., Detroit, Mich.
Vehicles, 92 ea—$174,412

GENERAL MOTORS CORP., FOREIGN DISTRIBUTORS DIV., New York, N. Y.
Diesel engines with spare parts, 3 ea and 1 lot—$11,008

FOREIGN DISTRIBUTORS DIV., GENERAL MOTORS CORP., New York, N. Y.
Automobiles and trucks, 96 total—$177,558

GENERAL MOTORS CORP., FOREIGN DISTRIBUTORS DIV., New York, N. Y.
Light trucks, 16 ea—$47,724

GENERAL MOTORS CORP., FOREIGN DIS. DIV., New York, N. Y.
Pickup trucks, 6 ea—$13,457

GENERAL MOTORS CORP., FOREIGN DISTRIBUTORS DIV., New York, N. Y.
Sedans, 4 door, 6 ea—$10,576

GENERAL MOTORS CORP., FOREIGN DIST. DIV., New York, N. Y.
Trucks, 15 ea—$28,426

GENERAL MOTORS CORP., FOREIGN DISTRIBUTORS DIV., New York, N. Y.
Vehicles, 7 ea—$12,949

HUBER-WARCO CO., Marion, Ohio
251 motorized road graders—$2,997,389

INTERNATIONAL HARVESTER EXPORT CO., Chicago, Ill.
Light trucks, 7 ea—$17,218

INTERNATIONAL HARVESTER CO., Chicago, Ill.
Tractor, wheeled, 307 ea—$457,728

INTERNATIONAL HARVESTER EXPORT CO., Chicago, Ill.
Trucks, 77 ea—$195,130

INTERNATIONAL HARVESTER CO., Washington, D. C.
Bus, 1 ea—$10,209

INTERNATIONAL HARVESTER CO., Washington, D. C.
Heavy trucks, 5 ea—$14,152

INTERNATIONAL HARVESTER CO., Washington, D. C.
Light trucks, 19 ea—$55,262

INTERNATIONAL HARVESTER CO., Washington, D. C.
Trucks, 36 ea—$650,417

IOWA MFG. CO., Cedar Rapids, Iowa
Construction Equipment, 1 ea—$158,456

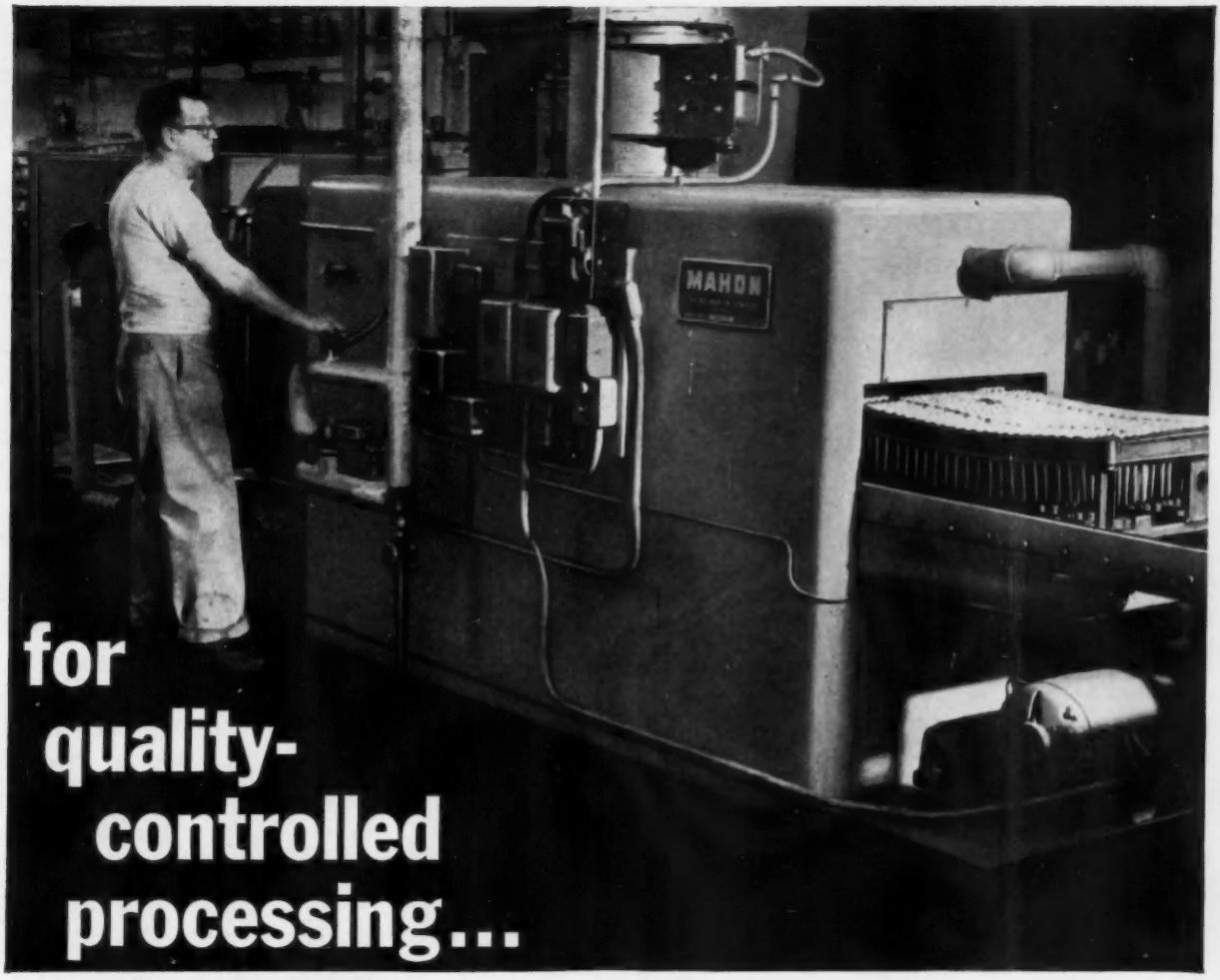
KEARNEY & TRECKER CORP., Milwaukee, Wis.
Milling machine, 2 ea—$58,028

LAHER SPRING & TIRE CORP., Oakland, Calif.
Automotive storage batteries, indefinite quantity

LeTOURNEAU - WESTINGHOUSE CO., Peoria, Ill.
Grader, Road, Motorized, 116 ea—$1,270,737

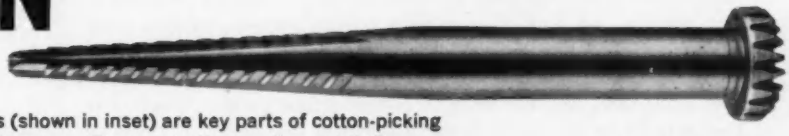
EDWARD A. LYNCH MACHINERY CO., INC., Wynnewood, Pa.
Hydraulic Press Brake, 2 ea—$30,000

(*Turn to page* 160, *please*)



for quality-controlled processing... industrial equipment by MAHON

'cotton-picking' spindles thoroughly cleaned 500 at a time for International Harvester



Hardened, chromium-plated, barbed spindles (shown in inset) are key parts of cotton-picking machines made by International Harvester Company. These spindles are the metal 'fingers' that actually field-pick the cotton—several million are produced each year at IH's Memphis, Tenn., Works. A critical step in processing these parts is thorough cleaning before heat treating and plating. Removal of oil, grease, and foreign matter from the spindle surfaces is essential to insure uniform hardness . . . and long product life.

For **"quality-controlled processing"** the spindles are washed and dried in Mahon equipment. This special machine, developed for International Harvester from Mahon Industrial Equipment Division 'almost-standard' designs, means production efficiency . . . product quality . . . faster delivery and reasonable cost. Over the years Mahon equipment is your best investment. Call in a Mahon industrial engineer; let him prove why.

In cleaning a 500-piece-load of cotton-picking spindles, the two-stage Mahon machine washes the parts with detergent in hot water (at 180°F); then hot-air dries the load at (250°F). Automatic cycle time is about 15 minutes per load.

YOUR BIGGEST VALUE IS IN MAHON'S PLANNING & ENGINEERING EXPERIENCE

THE R. C. MAHON COMPANY
DETROIT 34, MICHIGAN
MANUFACTURING PLANTS—Detroit, Michigan and Torrance, California
SALES-ENGINEERING OFFICES—Detroit, New York, Chicago, San Francisco and Torrance.

MAHON

Circle 197 on Inquiry Card for more data

Contract Awards

(*Continued from page* 158)

MACHINERY ASSOCIATES, INC., Wynnewood, Pa.
Lathe, 10", 2 ea—$27,848

MACHINERY ASSOCIATES, INC., Wynnewood, Pa.
Lathe, engine

MACHINERY ASSOCIATES, INC., Wynnewood, Pa.
Lathe floor type, 2 ea—$37,325

MARTIN COMPANY, Orlando, Fla.
Guided missiles—$3,300,000

QUICK-WAY TRUCK SHOVEL CO., Denver, Colo.
Crane, shovel, power unit, 100 units—$2,756,218

RAYTHEON MANUFACTURING CO., Waltham, Mass.
Guided missiles—$23,600,000

RAYTHEON CO., Waltham, Mass.
Missile system—$13,560,853

RAYTHEON CO., Waltham, Mass.
Support equipment—$1,500,000

RAYTHEON COMPANY, Waltham, Mass.
Missile program—$17,000,000

SIKORSKY AIRCRAFT, DIV. UNITED AIRCRAFT CORP., Stratford, Conn.
Helicopters—$4,688,219

STEDFAST & ROULSTON, INC., Boston, Mass.
Kearney & Trecker Milwaukee-Matic—$148,717

STUDEBAKER-PACKARD CORP., South Bend, Ind.
Passenger cars, 33 ea—$47,942

TWIN COACH CO., Buffalo, N. Y.
400 chassis trailers, 3560 cargo trailers—$2,351,094

UNIVERSAL BATTERY CO., Chicago, Ill.
Automotive Storage Batteries, indefinite quantity

WALTER MOTOR TRUCK CO., Voorheesville, N. Y.
Trucks, 1 ea—$14,480

WESTRIC BATTERY CO., Denver, Colo.
Automotive storage batteries, indefinite quantity

THE WHITE MOTOR CO., Cleveland, Ohio
Truck-tractors—10 ea—$75,687

WILLYS MOTORS, INC., Toledo, Ohio
Trucks, 466 ea—$978,112

WILLYS MOTORS INC., Toledo, Ohio
Light trucks, 21 ea—$51,885

WILLYS MOTORS, INC., Toledo, Ohio
Station Wagon trucks, 10 ea—$21,842

WILLYS MOTORS INC., Toledo, Ohio
Vehicles, 14 ea—$29,169

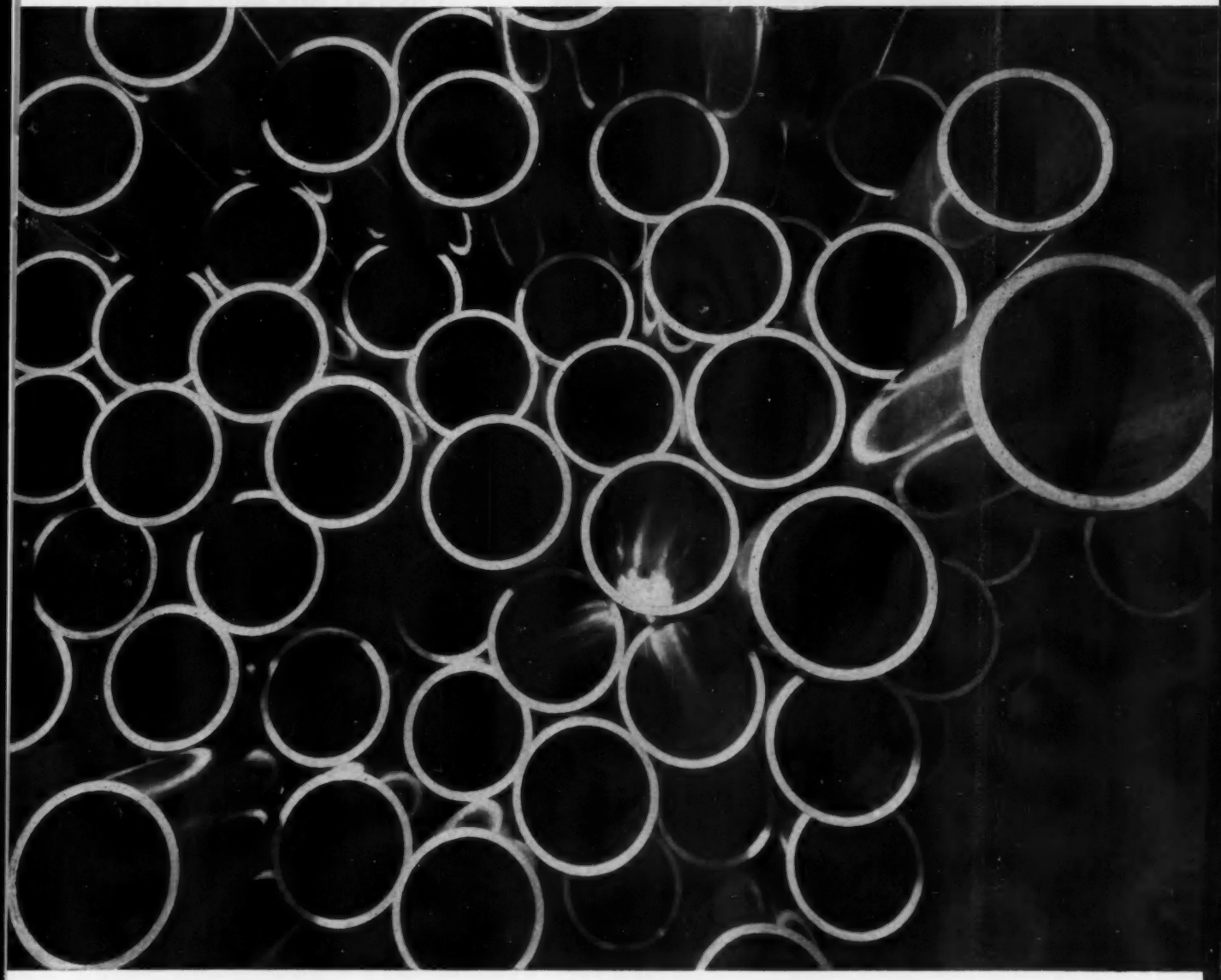
WILLYS MOTORS INC., Toledo, Ohio
Willys Station wagons, 6 ea—$14,221

Instrumentation Use To Be Discussed

Increasing use of advanced instrumentation techniques in the automotive industry will be the subject of one of the 50 technical sessions of the Fall Instrument-Automation Conference & Exhibit of the Instrument Society of America in New York during the week of Sept. 26.

Three papers describing instrumentation installations will discuss the over-all system, details of unique components designed and developed, and performance of the instruments under actual operating conditions.

This mark tells you a product is made of modern, dependable Steel.



Look at the dimensional accuracy and smoothness

You can reduce the costs and processing time of parts-making by using USS National Electric-Resistance Welded Mechanical Tubing. It eliminates drilling operations. It lets you replace drills with simple, less expensive boring tools. Mechanical Tubing reduces tool wear and tool changes.

USS National Electric Welded Mechanical Tubing is an ideal load-carrying member. It resists bending stresses equally in all directions and gives you a superior cross section. It absorbs and localizes shock. In torsion, it provides better material distribution. And for a given weight, mechanical tubing withstands more load than other sections.

USS National Electric Welded Mechanical Tubing is available in cold-drawn or hot-rolled sizes ⅜″ thru 5½″ and in wall thicknesses .035″ to .250″. It can be obtained from National Tube Distributors located throughout the country. They will gladly show you how to use USS National Welded Mechanical Tubing in your next application. *See your USS National Tube Distributor.*

USS and National are registered trademarks

National Tube Division of United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
United States Steel Supply Division
United States Steel Export Company, New York

New Plant and PRODUCTION EQUIPMENT

(*Continued from page* 87)

Multi-Feed Trunnion

TRUNNION machines, that have several different feed rates for individual tools or groups of tools mounted on a single hydraulic feed unit, features accelerated spindles which are used to obtain different feed rates. Individual operations can be set up for best surface finish, minimum tool costs and maximum tool costs and maximum tool life.

A typical trunnion machine built with this approach is used for processing combination clutch and brake master cylinders, which require drilling, spot-facing, hollow milling and reaming. All of the tools are mounted on a single head. *The Cross Co.*

Circle 67 on postcard for more data

Small Parts Conveyor

NEOPRENE belt conveyors, 6 ft long and 6 in. wide, are manufactured complete with special gearhead motor and Start-Stop switch. The ½ in. high solid rubber neoprene cleats are molded onto conveyor belt. Sides are enclosed and the bottom is equipped with a tray to catch any spillage. The face of the belt is covered by a Plexiglas shield and the return belt is enclosed in a metal casing.

A steel hopper is equipped with a rubber flapper to prevent loss of parts and is attached to the lower end.

Small Parts Conveyors may be used to move small parts from one level to another. *Sage Equipment Co., Inc.*

Circle 68 on postcard for more data

Versatile Test Unit

A VERSATILE bench type roll tester, for gears with center distances from 1¾ to 6 in., is now available with a checking recorder as extra equipment. The standard tester has a spindle type mounting stud for the master gear. If it is desired to use it as a conventional tester, a set screw locks the stud. The tester will check size, eccentricity and meshing smoothness of either helical or spur gears from 8 to 48P. When used with a dial indicator, deflections are shown in increments of 0.0005 in. *Michigan Tool Co.*

Circle 69 on postcard for more data

(*Turn to page* 164, *please*)

Thor

Everything you want in Torque Control···

and more!

Thor Uni-Tork screwdrivers and nut setters make torque control of threaded fasteners as simple as turning on a light. Operator judgment and guesswork is gone. Uni-Tork snaps out of engagement when desired torque is reached, snaps in again when applied to the work. Thor Uni-Tork air tools have external torque adjustments from 10 to 100 inch-pounds. Available on all Thor air screwdrivers and nut setters and on Thor electric tools. Your Thor factory representative or distributor will show you the tools that think for themselves. Thor Power Tool Company, Aurora, Illinois. Branches in all principal cities.

Thor POWER TOOLS

(Continued from page 162)

Large Size Bender

THIS rotary bending machine has been designed to meet the heavy bending requirements of the automotive, farm equipment and aircraft industries. It will form large pipe, tube, channel, angle and solid bar. The machine is built in two versions. When set up for bending heavy materials, the machine is called the model 6 and will handle production bending of extra-heavy steel pipe up to 6 in., channel to 9 in. x 15 lb, square steel bar to 4¼ in., round solid steel bar to 5 in. dia., and steel angles to 8 in. x 8 in. by ¾ in. When the machine is adapted for handling thin wall tubing as used in the aircraft industry, the machine is known as the model A-8, and is capable of bending tubes up to 8 in. O D with wall thicknesses up to 0.250 in. wall steel tube. *Pines Engineering Co., Inc.*

Circle 70 on postcard for more data

Cutting Tool Grinder

KNOWN as the Multi-Spiral Universal Grinder, a new grinding machine will grind a wide variety of cutting tools. Standard End Mills, Fast Spiral End Mills, Taper End Mills, Taps, Reamers, Counterbores, Core Drills, Step Drills, Angle Cutters, Side Milling Cutters, Spiral Slab-Cutters, Tee-Slot Cutters and many other cutting tools. In addition, the manufacturer claims the new grinder can make End Mills, Step Drills, Drills, Reamers and Counterbores plus all end cuttings tools, spiral or straight fluted, ground from the solid. Specifications of this unit are: Spindle capacity 1¼ in. hole 5¾ in. deep; Spindle stroke 3¾ in.; Index spool for 2-3-4-6 divisions; Vertical slide for raising and lowering motor 4 in. above center and 2 in. below center; Motor swivels 20 deg. either way; Two way slides; Bottom slide has screw and lever action 3 in. travel with graduated hand wheel; Top slide-screw actuated with 3 in. travel; Vertical slide mounted on platten for easy positioning; Motor spindle equipped for grinding wheel adapters; Motor is ½ H.P., 115 Volt, 60 cycle, 3450 R.P.M. and friction brake; All slides have metal dust guards. The complete Grinding Unit rests on top of steel base 19¼ in. wide, 25 in. deep, 29⅝ in. high. *Spiral Step Tool Co.*

Circle 71 on postcard for more data

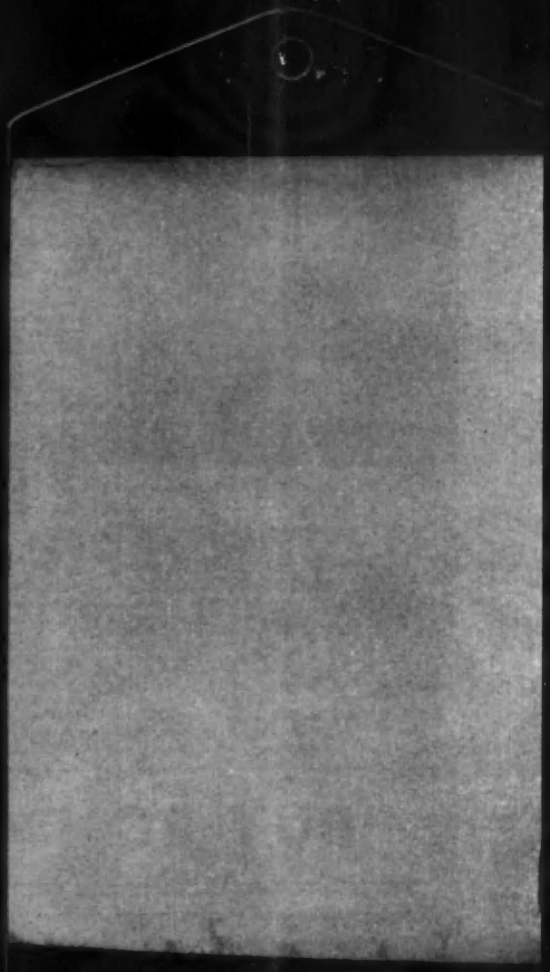
(Turn to page 166, please)

M&T "Duplex Chromium" makes this difference in CASS tests

Zinc die cast panels after 272 hours CASS tests. Both had same copper and dual nickel undercoats.

Left panel, plated with 0.01 mil ordinary chromium gets ASTM rating of 0.

Right panel, plated with 0.10 mil "DUPLEX CHROMIUM" still rates a perfect 10.



The thicker the "Duplex Chromium" ...the longer the plating lasts

THE hours that plated samples survive in CASS* tests indicate the life expectancy of the parts in actual outdoor use. Results obtained with this modern, severe corrosion-testing technique prove that M&T "DUPLEX CHROMIUM" radically increases protection. They further show that the *thicker* the chromium plate the *longer* the finish lasts.

Here then is the best way to upgrade durability of decorative, chromium plated automotive and other steel and zinc die cast parts. You'll get a dramatic improvement with a thickness of 0.05 mil M&T "DUPLEX CHROMIUM" over suitable nickel . . . and even more remarkable service life with 0.10 mil.

For plating thicker chromium, Unichrome SRHS® (self regulating high speed) Chromium baths have no equal. They alone give the right *type* of deposit. They not only speed production but also simplify it. M&T "DUPLEX CHROMIUM," using two of these baths, consists of a layer of Crack-Free Chromium topped by another special layer of SRHS® Chromium that minimizes localized corrosion due to tiny imperfections in the basis metal. The Crack-Free Chromium also assures more uniform distribution of the plating, so that recesses, too, get amply thick deposits without graying or burning on edges. Write for technical data or for an M&T plating engineer.

*Copper accelerated acetic acid salt spray test

M&T

plating products · welding products
coatings · metals · chemicals

METAL & THERMIT CORPORATION, General Offices: Rahway, New Jersey

(*Continued from page* 164)

Forming and Piercing Unit

THE most outstanding feature of a machine that has been designed for shearing, forming and piercing operations is that it will cut the center of a ¼ in. mild steel plate without a starting hole. Throat depth of this unit is 49½ in., permitting circle cutting up to 48 in. dia inside the throat. *Lennox Tool and Machine Builders Div., Lennox Industries, Inc.*

Circle 72 on postcard for more data

Crankshaft Fillet Rolling

Now available is a complete line of crankshaft fillet rolling machines for shafts up to 84 in. long, with models for processing all fillets on any size or style crankshaft.

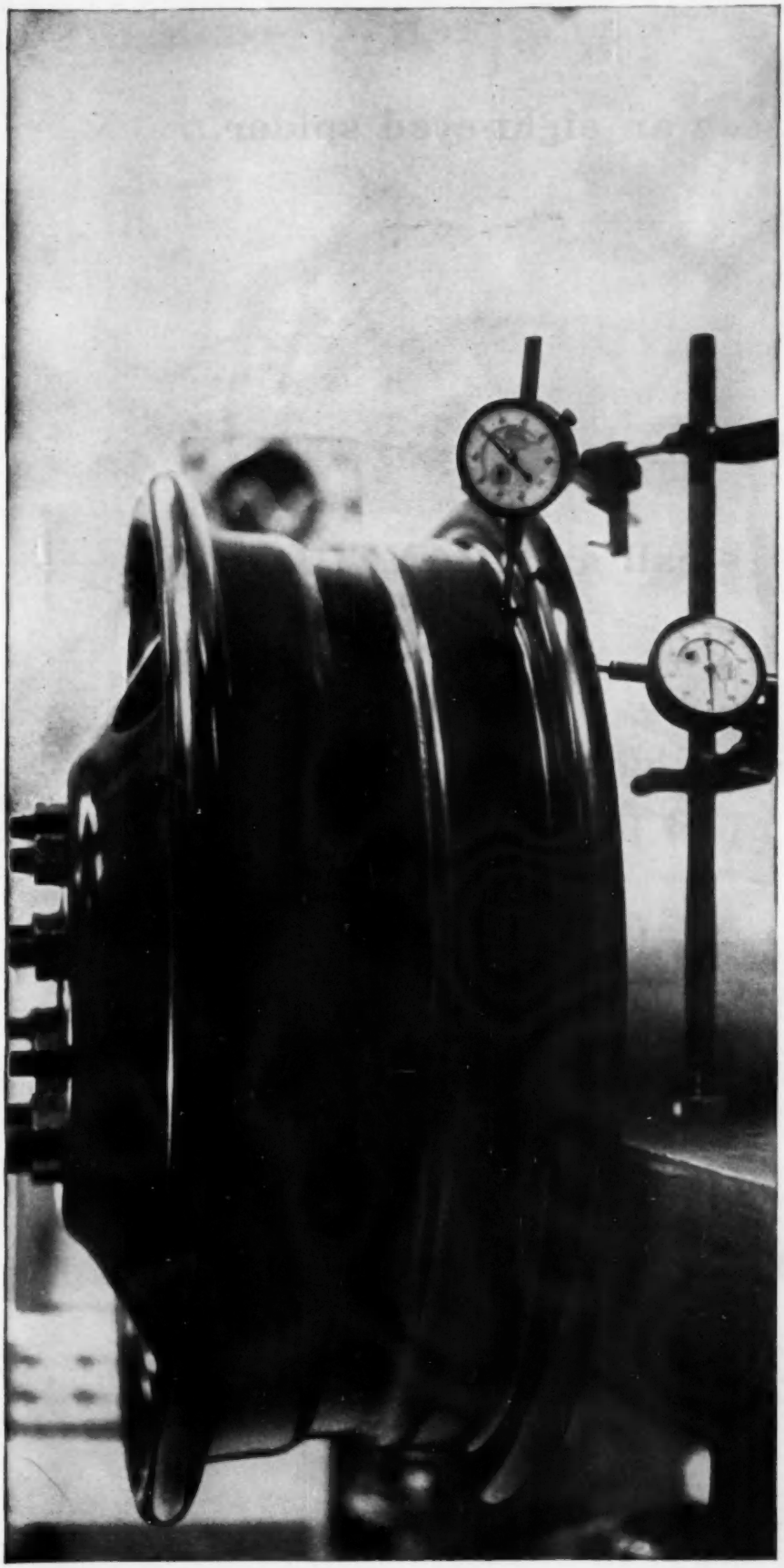
According to the manufacturer of this line, the fillet rolling process eliminates fatigue failure efficiency at the fillets where it is most likely to occur when the crankshaft is subject to high torque.

These units have specially designed, hardened rollers (two opposed sets in each head). The contact surfaces on the roller face oscillate back and forth across the fillet as they turn under pressure against the rotating crankshaft. These rotating rollers create compressive stresses on the skin of the metal, superimposed over tensile stresses formed in the fibers underneath. The resulting balance of controlled stresses strengthens the fillets against fatigue failure. These machines are designed for high production. A feature of fillet rolling machines is that no master crank is needed; the heads automatically follow crankshaft bearing surfaces. Thus, no setup time or major adjustment is necessary when changing from one crank to another with a different stroke. If fillet spacing changes, the heads can be relocated by loosening one screw on each, moving the heads to the new spacing, and retightening.

The units designated model-A roll fillets on crankshafts up to 24 in. long with swing up to 12 in. The model-B machines accept work up to 40 in. long, with swing up to 12 in. Model-HD holds crankshafts up to 84 in. long, with swing up to 16 in. All can be provided with varying numbers of heads.

Clamping, tailstock, and rolling arms (for both raise-lower and clamp-unclamp) are hydraulically operated. *The Foote-Burt Co.*

Circle 73 on postcard for more data



truck wheels that measure up . . .

Here is one of many millions of truck wheels built by Kelsey-Hayes for commercial vehicles where radial and lateral run-out must be held to industry's closest tolerances for smooth, true-running performance.

Three-piece rim construction with tubular side ring and lock ring for positive "blow-off" protection along with the fine surface finish and dimensional exactness of its rugged cold-rolled disc makes Kelsey-Hayes advanced wide-base wheel construction the choice of fleet operators the world over.
Kelsey-Hayes Company,
Detroit 32, Michigan.

KELSEY HAYES COMPANY

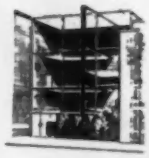
Automotive, Aviation and Agricultural Parts
Hand Tools for Industry and Home

18 PLANTS: Detroit and Jackson, Michigan; Los Angeles; Philadelphia and McKeesport, Pennsylvania; Springfield, Ohio; New Hartford and Utica, New York; Davenport, Iowa; Windsor, Ontario, Canada.

K H


When you see an eight-eyed spider...
call an ARANEOLOGIST
(specialist in spiders)

AUTOMOTIVE INDUSTRIES

A CHILTON  PUBLICATION

INDEX TO ADVERTISERS

This Advertisers' Index is published as a convenience and not as a part of the advertising contract. Every care will be taken to index correctly. No allowance will be made for errors or failure to insert. When writing to advertisers please mention AUTOMOTIVE INDUSTRIES

To get catalogs, engineering data, or other additional information from advertisers, please circle appropriate number on post card at back of this issue. An inquiry card number appears at the bottom of each advertisement

Technical Literature
for your own
ENGINEERING LIBRARY

New Catalogues, Bulletins, Data Sheets and Reports

Advertisers' Products and Services Data; and more Information on New Production Equipment and New Products described editorially in this issue

FREE POSTCARD INQUIRY SERVICE

Just circle the Numbers you want on Inquiry Postcards, and mail promptly

By C. J. Kelly
ASSISTANT EDITOR

Thread Data 1

The thread strength of tension bolts, screws and fasteners is discussed in a 20-page booklet which contains technical information, illustrations, line drawings, data charts and graphs. *Standard Pressed Steel Corp.*

Motors 2

Alternating current motors designed to meet the requirements of government specification for aircraft and missile applications are discussed in a new catalog. This booklet contains information on horsepower, torque, duty cycle, speed and weight. *Lear, Inc.*

Steel Bars 3

An informative case study portfolio shows a variety of applications of steel bars in metalworking machinery and equipment parts. It contains a total of nine individual case studies, and shows how manufacturers are meeting and solving the problems related to part production. Each study, specific part involved and the material it replaced. *The LaSalle Steel Co.*

Thrust Bearings 4

The features of cylindrical roller precision thrust bearings are detailed in a new catalog. Engineering data is included to show the 30 per cent increase in load capacity and a new line of thrust bearings with metric dimensions. This booklet is number PT-659. *Rollway Bearing Co.*

Pipe Chart 5

A new pipe chart is available to show the dimensions and weights of various steel pipe. Fourteen different schedules are shown with sizes ranging from ⅛ to 30 in. P.S. Stainless users will find it especially helpful—where the wall thickness specified for stainless pipe differs from that of carbon pipe, the data for stainless is shown. *Peter A. Frasse and Co.*

Pocket Selector 6

A shirt-pocket-size selector booklet describes a line of circuit breaker load centers and meter socket-load centers. It contains a wiring diagram, listing of rating, circuit capacities and other pertinent information. *General Electric Co.*

FREE LITERATURE---USE THESE POSTCARDS
(Please turn page)

Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted. **7/15/60**

Please send further information on items circled below.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220
221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240
241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260
261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280
281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300

YOUR NAME .....TITLE.....

COMPANY .....

PLANT ADDRESS .....

CITY .....ZONE.....STATE.....

FIRST CLASS
Permit No. 36
New York, N. Y.

BUSINESS REPLY MAIL
No Postage Stamp Necessary If Mailed in the United States

POSTAGE WILL BE PAID BY

AUTOMOTIVE INDUSTRIES
P. O. Box 66,
Village Station,
New York 14, N. Y.

Readers Service Dept.

continued . . .

TECHNICAL LITERATURE

for your own

ENGINEERING LIBRARY

New Catalogues, Bulletins, Data Sheets and Reports

Advertisers' Products and Services Data; and more Information on New Production Equipment and New Products described editorially in this issue.

FREE POSTCARD INQUIRY SERVICE

Just circle the Numbers you want on the Inquiry Postcards and mail them promptly

By C. J. Kelly
ASSISTANT EDITOR

Press Data 7

A 16-page booklet describes an entire line of press equipment designed for pressure processing applications. It illustrates and describes processes for forming, drawing, blanking, forging and others. *The Hydraulic Press Mfg. Co.*

Stamping Data 8

Large volume producers of ferrous and non-ferrous formed parts will be interested in a 32-page book which deals with problems in excessive scrap losses, die damage and machine repairs caused by multiple heading in press stamping operations. This publication sets forth detailed, illustrated information to guide the application engineer. *Robotron Corp.*

Technical Bulletin 9

Technical bulletin 59-220, 8 pages, objectively discusses infrared sources theories and laws; prediction of quantity and quality of radiation from heated sources; color blindness; and other technical points. *The Fostoria Corp., Infrared Div.*

Industrial Diamonds 10

An article of fundamental importance for users and manufacturers of abrasive wheels appears in the current issue of *Diamond Data*. Entitled "The Other Properties of Diamond," the article is reported to be a comprehensive presentation that documents the properties other than its hardness. It discusses the strength, properties and technical information. *The Industrial Diamond Div., Engelhard Hanovia, Inc.*

Engine Catalog 11

Small engines are covered in a new easy-to-read catalog. It features silhouette pictures, and complete price lists for all components. *The Automotive Electric Association.*

Heat Treat Review 12

This booklet is an interesting four-page discussion of the newest developments and present status of high temperature gas carburizing. It is illustrated with numerous heating curves, test sample photomicrographs and photos of typical high temperature carburizing equipment. *Midland-Ross Corp.*

Tool Catalogs 13

Four new catalogs are available to aid in selecting the proper tool for a specific application. Included in these publications are: tool design data, features, tolerances, materials to cut production uses and dimensional drawings. *Brown and Sharpe Mfg. Co.*

Snap-Action Switch 14

This "How Others Do It" publication contains ideas submitted by plant engineers and electricians showing how they've used snap-action switches to increase production efficiency. Illustrated by drawings and photographs, this 28th issue contains six methods which can save man-hours, protect operators and machinery, and eliminate waste. *Micro Switch Div., Minneapolis-Honeywell Regulator Co.*

Materials Booklet 15

"Fiberglas Textile Fiber Materials for Industry" is the name given to a 52-page booklet which is designed to show the wide range of applications in which fiberglas materials made from the continuous filament and staple fiber processes can be effectively utilized. Included in the publication is a section that shows the fabrication of this material and a comparison chart. *Owens-Corning Fiberglas Corp.*

Electric Trucks 16

The purpose of this booklet is to describe and illustrate the major features and operating characteristics of the battery powered electric industrial truck and to show what users say about its advantages. This booklet is issued under joint cooperation of many different manufacturers of battery-electric industrial trucks. *National Opinion and Statistical Survey.*

Truck Costs 17

The problem of industrial truck costs is discussed in detail in four new booklets that contains technical data, charts and graphs. The cost studies shown in these publications were designed to acquaint plant personnel with all the factors that are to be considered in the selection of industrial trucks. *Exide Industrial Div., the Electric Storage Battery Co.*

Aluminum Bodies 18

Sixteen pages cover six major features of aluminum truck bodies. Long life, strength, maintenance, operating costs and light weight are discussed. *Clark Equipment Co.*

Control Equipment 19

Catalog 57-S7 covers a line of accessories and special control equipment used in industrial applications. Included are schematic drawings, illustrations and technical data. *The Automatic Switch Co.*

Proving Rings 20

A 4-page illustrated booklet, bulletin P-260, describes complete lines of dial-indicator and optical proving rings; instruments of force measurement used to calibrate other devices and to measure applied loads accurately. This booklet describes what they are, why they work, how they are made and their general characteristics. Also described is a light-weight 150,000-lb capacity calibration press in which small devices can be calibrated with a proving ring. *Steel City Testing Machines, Inc.*

Tool Tips 21

This seven-page booklet covers a line of machine tools, machine tool components and cutting tools used in their application. Illustrations, drawings and general information is also included. *Ex-Cell-O Corp.*

Coating Selector 22

A two part chart is offered to aid in the selection of specialty coatings that are available for application on plastic, metals, glass and wood. This chart is designed for quick reference, and shows the characteristics of spray, dip and flow coating materials, vacuum metallizing coatings and standard plastisol formulations. *The Bee Chemical Co.*

"Cutting-Edge" Costs 23

"How cutting edge costs can be reduced" is the subject of a 12-page brochure. Covered in this publication are reports from actual users from all parts of the country. Down time, cost per hour and other information is also included. *Caterpillar Tractor Co.*

FREE LITERATURE--USE THESE POSTCARDS

(Please turn page)

Postcard valid 8 weeks only. After that use own letterhead describing item wanted. **7/15/60**

Please send me further information on the items I have circled below.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220
221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240
241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260
261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280
281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300

YOUR NAME .....TITLE.....

FIRM .....

FIRM ADDRESS .....

CITY OR TOWN.....ZONE.....STATE.....

FIRST CLASS
Permit No. 36
New York, N. Y.

BUSINESS REPLY MAIL
No Postage Stamp Necessary If Mailed in the United States

POSTAGE WILL BE PAID BY

AUTOMOTIVE INDUSTRIES
P. O. Box 66,
Village Station,
New York 14, N. Y.

Readers Service Dept.

continued . . .

TECHNICAL LITERATURE
for your own
ENGINEERING LIBRARY

New Catalogues, Bulletins, Data Sheets and Reports

Advertisers' Products and Services Data; and more information on New Production Equipment and New Products described editorially in this issue.

FREE POSTCARD INQUIRY SERVICE

Just circle the Numbers you want on the Inquiry Postcards and mail them promptly

By C. J. Kelly
ASSISTANT EDITOR

Laminated Plastics 24

This brochure describes the facilities of a manufacturer and fabricator of industrial thermosetting laminated plastics. Using the theme, "Laminated Plastic Parts —Make or Buy?" the brochure gives eight specific reasons, plus additional information, what the advantages are in letting the manufacturer fabricate your part to your specifications or print. *Synthane Corp.*

Steam Cleaning 25

A 12-page booklet describes a line of steam cleaning equipment that ranges in capacities from 75 to 330 gph. Three types are discussed: fireless steam cleaners, self-contained and hydraulic pressure combination cleaning systems. It shows illustrations of the units themselves, typical applications and the specifications for the line. *Malsbary Mfg. Co.*

Vibratory Machines 26

A comprehensive catalog describes, illustrates and provides technical information on a line of vibratory machines. Also included in this publication are various types of parts that have been finished with these machines. The illustrations are the before and after type. *Almco, Queen Products Div., King-Seeley Corp.*

Plastic Parts 27

The problem of specifying molded plastic parts is outlined in a bulletin that covers a wide variety of parts. Illustrations show processes and precision machining operations involved in plastic molding. *The Hass Corp.*

Rust Preventive 28

Four types of rust preventive are described in a new booklet. Physical properties are discussed along with application data for each of the types. Laboratory results are illustrated, showing controlled-test information. *Wheelabrator Corp.*

Urethane Foam 29

Materials, equipment, design assistance and engineering know-how for the production of high-quality urethane foams are described in a new eight-page booklet. *Isocyanate Products, Inc.*

Packaging Unit 30

A six-page folder describes the operation of a machine used in packaging various size goods. It contains illustrations, the operation of the unit and a specification list of the 50A Packmaster. *Sunstrand-American Broach Div., Sunstrand Corp.*

FREE LITERATURE--USE THESE POSTCARDS

BUSINESS REPLY MAIL
No Postage Stamp Necessary If Mailed in the United States

POSTAGE WILL BE PAID BY

AUTOMOTIVE INDUSTRIES
P. O. Box 66,
Village Station,
New York 14, N. Y.

Readers Service Dept.

FIRST CLASS
Permit No. 36
New York, N. Y.

Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted.

Please send further information on items circled below. **7/15/60**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220
221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240
241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260
261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280
281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300

YOUR NAME .....TITLE.....

COMPANY .....

PLANT ADDRESS .....

CITY .....ZONE.....STATE.....

Ambient

ambient AMBIENT Ambient Ambient Ambient

A New Word FOR BETTER PHOSPHATE COATING

amb:

Am'bi-ent temperature The temperature of the medium surrounding an object; as for example, the air temperature in a building.

More Efficient — More Economical

Ambient

Exhaustive field tests have proved beyond question that ambient temperature phosphate coating processes are the most efficient and provide measurable cost savings in heat and chemicals.

The operating conditions of ambient temperature phosphate coatings are natural. They require no artificial cooling or heating to maintain baths at natural temperatures. And most important, *there is no sacrifice of quality* since a remarkable ease of control can be maintained with this system.

We would like to explain the advantages of our ambient temperature process in detail. Your Detrex field engineer is fully qualified to answer your questions. Write to:

DETREX CHEMICAL INDUSTRIES, INC.

P. O. Box 501, Dept. AI-760S, Detroit 32, Michigan

Circle 102 on Inquiry Card for more data

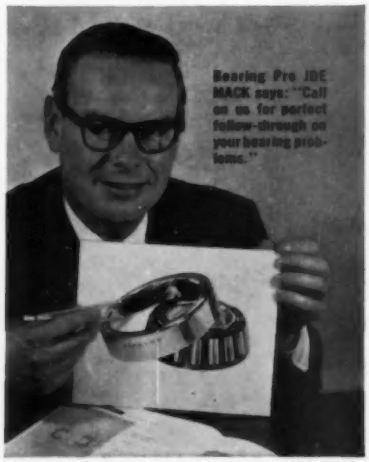
Remember when

THEY COULDN'T SPOOK THE "JOPLIN GHOST"

It's a three-way tie going into the final round of the 1928 Oklahoma City Open. Two contenders take a birdie four on the first hole. Horton Smith—the "Joplin Ghost"—takes a six. Does it spook him? A steady swing and the ball flies straight as a die to the second hole, a 135 yarder. It rolls into the cup for a hole in one. Lucky? It's what he was aiming at. And Smith went on to win the tournament.

When the pressure's on, it's skill, steadiness and confidence that count. It's the kind of performance you expect and find in the pros in any field.

In bearings, Timken Company engineers are pros in every sense of the word. They have more experience designing and applying tapered roller bearings than anyone else. They've found more ways to improve them than anyone else. They've learned how to produce better Timken tapered roller bearings for less cost to give you better value. And they're more than ready to provide all the service you need to give your customers trouble-free mileage, cut your warranty and assembly costs.



This is professionalism that gives you the most for your bearing dollar. Call in Timken Company sales engineers—they have the answers. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.

TIMKEN®

tapered roller bearings

from the pros of the bearing business

Circle 103 on Inquiry Card for more data